

## Annex R Placer County Water Agency

### R.1 Introduction

This Annex details the hazard mitigation planning elements specific to Placer County Water Agency (PCWA or Agency), a previously participating jurisdiction to the 2016 Placer County Local Hazard Mitigation Plan (LHMP) Update. This Annex is not intended to be a standalone document but appends to and supplements the information contained in the Base Plan document. As such, all sections of the Base Plan, including the planning process and other procedural requirements apply to and were met by the Agency. This Annex provides additional information specific to PCWA, with a focus on providing additional details on the risk assessment and mitigation strategy for this Agency.

### R.2 Planning Process

As described above, the Agency followed the planning process detailed in Chapter 3 of the Base Plan. In addition to providing representation on the Placer County Hazard Mitigation Planning Committee (HMPC), the Agency formulated their own internal planning team to support the broader planning process requirements. Internal planning participants, their positions, and how they participated in the planning process are shown in Table R-1. Additional details on plan participation and Agency representatives are included in Appendix A.

*Table R-1 PCWA – Planning Team*

Name	Position/Title	How Participated
Andy Fecko	General Manager	MS Teams access for documents and collaboration.
Brent Smith	Dir. Technical Svs.	MS Teams access for documents and collaboration.
Jay L'Estrange	Dir. Power Generation	MS Teams access for documents and collaboration.
Tony Firenzi	Dir. Strategic Affairs	MS Teams access for documents and collaboration.
Darin Reintjes	Dir Resource Mgt.	MS Teams access for documents and collaboration.
Dan Kelly	Counsel	MS Teams access for documents and collaboration.
Daryl Hensler	Dir. Field Svs.	MS Teams access for documents and collaboration.
Matt Young	Dir. Customer Svs.	MS Teams access for documents and collaboration.
Joseph Parker	Dir. Finance	MS Teams access for documents and collaboration.
Michael Willihnganz	Dir. Admin. Svs.	MS Teams access for documents and collaboration.
Ryan Cline	Dir. Energy Mkt.	MS Teams access for documents and collaboration.
Linda Higgins	Deputy Dir. CS	MS Teams access for documents and collaboration.
Keith Brintnall	Maintenance Coord.	MS Teams access for documents and collaboration.
Sean Loman	Maintenance Coord.	MS Teams access for documents and collaboration.
Rodney Lake	Maintenance Coord.	MS Teams access for documents and collaboration.

Name	Position/Title	How Participated
Randy Cox	Water Mgt. Specialist	MS Teams access for documents and collaboration.
Richard Vorous	Hydro Engineer II	MS Teams access for documents and collaboration.
Jeremy Shepard	Deputy Dir. Eng.	MS Teams access for documents and collaboration.
Aaron Sullivan	Engineering Svs. Mgr.	MS Teams access for documents and collaboration.
Kyle Dushane	Hydro Engineer II	MS Teams access for documents and collaboration.
Ed Horton	Consultant	Review of mitigation list and suggestions
Peter Cheney	Risk & Safety Mgr.	Internal and external liaison, meetings and editing.

Coordination with other community planning efforts is paramount to the successful implementation of this LHMP Update. This section provides information on how the Agency integrated the previously approved 2016 Plan into existing planning mechanisms and programs. Specifically, the Agency incorporated into or implemented the 2016 LHMP through other plans and programs shown in Table R-2.

***Table R-2 2016 LHMP Incorporation***

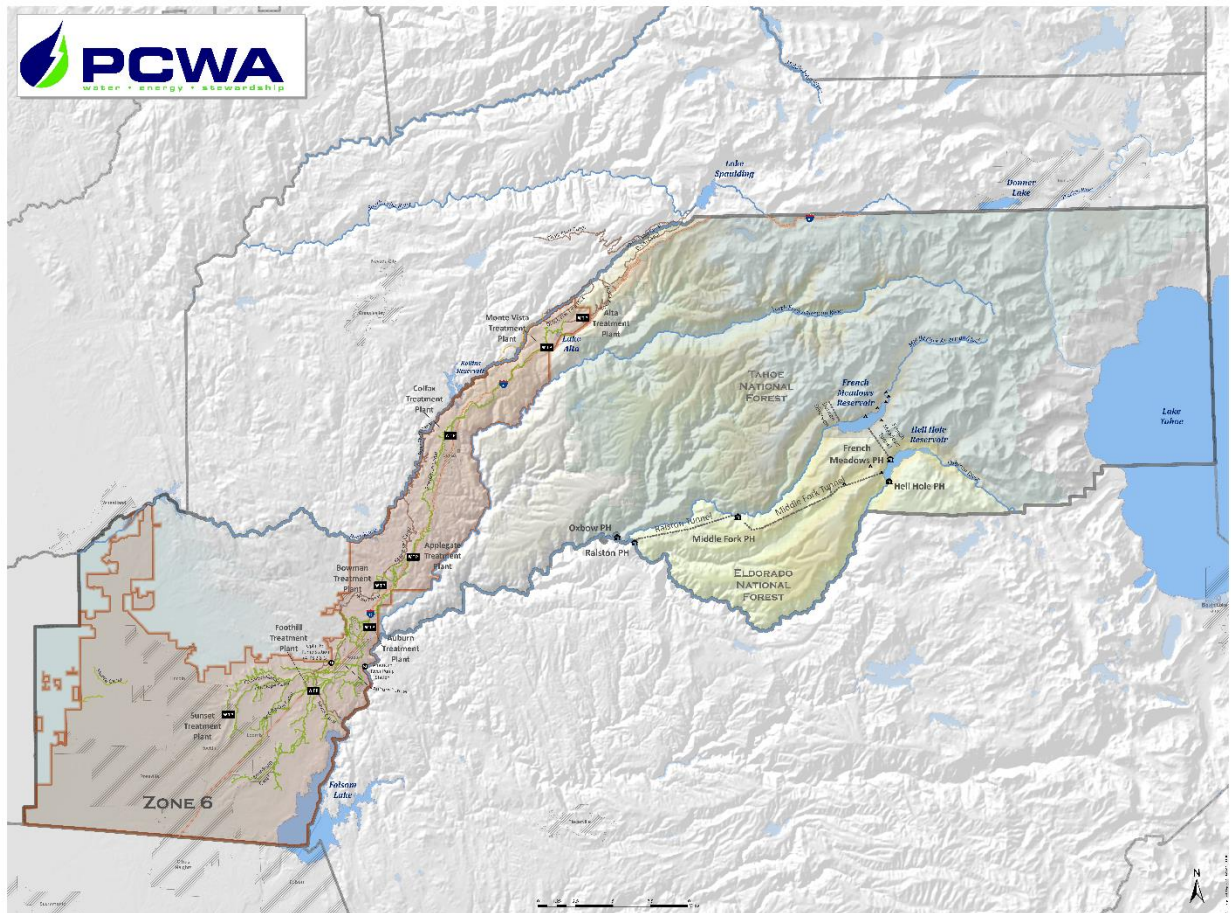
Planning Mechanism 2016 LHMP Was Incorporated/Implemented In.	Details: How was it incorporated?
Canal Gunite Projects – Soil bank erosion and water conservation for drought.	Ongoing in capital planning budgets and operations. \$1M per. year.
Canal Gunite Middle Fiddler Green & Pulp Mill	FEMA Claims & internal funding for continued service
Hillside Slope Stabilization. Rockfall anchors and netting at Interbay Road	Insurance funded loss, repair prevents /limits additional loss. Ongoing Capital Plans
Hell Hole Dam Core Raise	Capital Project to increase storm water capacity.
French Meadows Forest Fire Restoration Project	Community partnership and funding to reduce high-severity wildfires and watershed restoration.
Replace wooden flume structures to prevent wildfire and hazardous materials service interruptions.	Capital plan and spending. Piped Long Ravine, Secret Town, Penryn #1 Fumes put into pipe.
American River Pump Station hardening & repair after 2017 flooding/storms.	FEMA Claims & internal funding for continued service
LL Anderson Dam Spillway Modification.	Completed Capital Project for storm water management.
Multiple water system interties increasing redundancy of water supply. 2017-2019	3 Capital Projects completed with Nevada Irrigation District, Mt. Vernon, Locksley Lane and the Live Oak Intertie
Vegetation Management & Brushing Maidu Field Office Canyon Fire Resiliency Project	2020 Agency Capital funding in conjunction with
Vegetation Management & Brushing below American River Pump Station power lines.	2020 Agency Operational Funding
Vegetation Management & Brushing	2019 Monta Vista Treatment Plant, Operational Funding and partnership with Cal Fire
Vegetation Management & Brushing	2015 Lake Arthur 33-Acres, partnership with Cal-Fire
Vegetation Management & Brushing	2016/17 Lake Theodore 78-Acres, Partnership with Cal Fire

Planning Mechanism 2016 LHMP Was Incorporated/Implemented In.	Details: How was it incorporated?
Vegetation Management & Brushing	2018 Bill Francis Drive project with Cal-Fire
Debris, sedimentation de-silting projects for dam safety and water storage	Ralston Afterbay, North & South Fork Diversions 2016, 17, and 18 Capital and Emergency Projects
Dam management Mammoth reservoir low level outlet replacement	Capital project replacing

## R.3 Agency Profile

The Agency profile for the PCWA is detailed in the following sections. Figure R-1 displays a map and the location of the Agency within Placer County.

*Figure R-1 PCWA*



### R.3.1. Overview and Background

The Placer County Water Agency (PCWA) encompasses the entire, 1,500-square-mile boundary of Placer County, ranging from the rim of the Sacramento Valley on the west to the Sierra Nevada and Lake Tahoe

on the east. PCWA is headquartered in Auburn, the County seat of Placer County, nestled into California's Gold Country. The Agency is self-governed with policy and regulatory decisions determined by an independently elected five-member Board of Directors.

The Placer County Water Agency was created under its own state legislation entitled the "Placer County Water Agency Act," adopted in 1957 by the California State Legislature. PCWA carries out a broad range of responsibilities including water resource planning and management, retail, and wholesale supply of irrigation, drinking water and production of hydroelectric energy.

PCWA is actively involved in various watershed areas including the American River, Yuba and Bear rivers, the Lake Tahoe/Truckee River system, the Central Valley Project, and Bay/Delta system.

### *Water Supply*

The PCWA Water System supplies irrigation and treated water in four service zones in Central and Western Placer County, generally located along the Interstate 80 corridor between Roseville and Alta.

The Agency operates an extensive raw water distribution system that includes 170 miles of canals, ditches, flumes and several small reservoirs. Raw water feeds the drinking water treatment plants and a significant amount of Agency raw water irrigates agricultural land and golf courses. Drinking water is produced through a network of eight water treatment plants. About 20 percent of the water supplied by PCWA is retail treated drinking water; about 80 percent is for irrigation and some portion thereof for wholesale transfer. More than 150,000 people depend on PCWA for drinking water.

Other water purveyors in Placer County include PG&E, Alpine Meadows Water Association, Applegate Community Water Association, Central Eden Valley, Christian Valley Community Service District, Dutch Flat Mutual, Eden Valley Line, Foresthill Public Utility District, Heather Glen Community Services District, Meadow Vista County Water District, Midway Heights Community Water District, North Eden Valley Water Association, The Weimar Institute, and The Weimar Water Company.

### *Treated Water*

Surface water supplied by PCWA originates in the Sierra snowpack. Sources for PCWA treated water systems include the Yuba-Bear and American River watersheds. The source water for the treatment plants is supplied by a network of canal systems operated and maintained by PCWA and PG&E. The PCWA treated water systems supply consumers through more than 616 miles of PCWA maintained pipe to over 36,529 service connections. We estimate that PCWA serves more than 150,000 people with clean potable water.



*Photograph 1 Foothill Water Treatment Plant*

The PCWA's seven treated water systems including Alta, Applegate, Bianchi, Auburn/Bowman, Colfax, Foothill-Sunset, and Monte Vista. Six of the water systems are supplied through water treatment plants that treat surface water supplied via the PCWA canal system. The Bianchi system serves surface water purchased by the City of Roseville.



## *Fire Hydrants*

The Agency provides water to 5,454 fire hydrants over some 51 Fire Service zones through the treated water system. This critical service does not include drafting from canals, rural locations, or reservoirs. Treatment and distribution operators monitor water usage and adjust for large multiple alarm fires and wildfire extinguishing water consumption.

## *Irrigation*

About two thirds of the water supplied annually by PCWA is used for irrigation on the farms, ranches, landscapes, parks and golf courses of Placer County. The Agency operates 170 miles of canals, flumes reservoirs, and diversions to supply customers with untreated “raw” water. Approximately 4,283 irrigation water customers purchase water directly off from the canal system. The irrigation season normally runs from April 15 through October 15; however, many customers purchase water year-round. The irrigation season typically begins two weeks later in the higher elevation service areas around Colfax. Canal repair outages are typically scheduled in the early fall, between the irrigation season and heavy rains.

The PCWA irrigation water system also provides water for wildlife, riparian habitat, fire protection, recreation and scenic beauty. The Agency is very active in protecting the watershed and the quality of its source water.

## *Wholesale Water*

PCWA wholesales both treated and untreated water to at least 14 other water companies, agencies, or districts locally and regionally. We estimate that wholesale raw water serves another 98,741 consumers for a total end user customer base of 248,835 people.

## *Power System*

The PCWA Power System operates the Middle Fork American River Project (MFP), which is the eighth largest public power project in California. Completed in 1967 the MFP includes two major reservoirs, Hell Hole and French Meadows, seven dams, five hydroelectric power plants, and 24 miles of tunnels and related facilities. The project also includes recreational opportunities and facilities located adjacent to the high mountain reservoirs.



*Photograph 2 Interbay Dam*

On average (since 2013) The Middle Fork Project has produced an average of 1,100 Gigawatt hours of energy per year, which is enough clean, hydroelectric energy to power more than 165,000 homes. PCWA’s power output is distributed through Pacific Gas & Electric Company lines to the power grid, where the energy is sold on the open Cal-ISO power market.

## R.4 Hazard Identification

PCWA identified the hazards that affect the Agency and summarized their location, extent, frequency of occurrence, potential magnitude, and significance specific to Agency (see Table R-3).

**Table R-3 PCWA—Hazard Identification Assessment**

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude/Severity	Significance	Climate Change Influence
Agriculture Pests and Diseases	Significant	Occasional	Critical	Medium	Medium
Avalanche	Limited	Occasional	Limited	Low	Medium
Climate Change	Extensive	Likely	Limited	High	–
Dam Failure	Significant	Occasional	Catastrophic	High	Medium
Drought & Water Shortage	Extensive	Highly Likely	Critical	High	High
Earthquake	Limited	Likely	Limited	Low	Low
Floods: 1%/0.2% annual chance	Extensive	Occasional	Limited	High	Medium
Floods: Localized Stormwater	Significant	Highly Likely	Limited	Medium	Medium
Landslides, Mudslides, and Debris Flows	Significant	Likely	Critical	High	Medium
Levee Failure	Limited	Occasional	Critical	Low	Medium
Pandemic	Extensive	Likely	Critical	Medium	Medium
Seiche	Significant	Unlikely	Catastrophic	Low	Medium
Severe Weather: Extreme Heat	Significant	Highly Likely	Negligible	Low	High
Severe Weather: Freeze and Snow	Limited	Occasional	Negligible	Low	Medium
Severe Weather: Heavy Rains and Storms	Significant	Highly Likely	Limited	Medium	Medium
Severe Weather: High Winds and Tornadoes	Significant	Highly Likely	Limited	Low	Low
Tree Mortality	Extensive	Likely	Critical	Medium	High
Wildfire	Extensive	Highly Likely	Catastrophic	High	High
<p><b>Geographic Extent</b>  Limited: Less than 10% of planning area  Significant: 10-50% of planning area  Extensive: 50-100% of planning area</p> <p><b>Likelihood of Future Occurrences</b>  Highly Likely: Near 100% chance of occurrence in next year, or happens every year.  Likely: Between 10 and 100% chance of occurrence in next year or has a recurrence interval of 10 years or less.  Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.  Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.</p> <p><b>Magnitude/Severity</b>  Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths  Critical—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability  Limited—10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability  Negligible—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid</p> <p><b>Significance</b>  Low: minimal potential impact  Medium: moderate potential impact  High: widespread potential impact</p> <p><b>Climate Change Influence</b>  Low: minimal potential impact  Medium: moderate potential impact  High: widespread potential impact</p>					

## R.5 Hazard Profile and Vulnerability Assessment

The intent of this section is to profile the Agency's hazards and assess the Agency's vulnerability separate from that of the Placer County Planning Area as a whole, which has already been assessed in Section 4.3 Hazard Profiles and Vulnerability Assessment in the Base Plan. The hazard profiles in the Base Plan discuss overall impacts to the Placer County Planning Area and describes the hazard problem description, hazard location and extent, magnitude/severity, previous occurrences of hazard events and the likelihood of future occurrences. Hazard profile information specific to the Agency is included in this Annex. This vulnerability assessment analyzes the property and other assets at risk to hazards ranked of medium or high significance specific to the Agency. For more information about how hazards affect the County as a whole, see Chapter 4 Risk Assessment in the Base Plan.

### R.5.1. Hazard Profiles

Each hazard vulnerability assessment in Section R.5.3, includes a hazard profile/problem description as to how each medium or high significant hazard (as shown in Table R-3) affects the Agency and includes information on past hazard occurrences and the likelihood of future hazard occurrence. The intent of this section is to provide jurisdictional specific information on hazards and further describes how the hazards and risks differ across the Placer County Planning Area.

### R.5.2. Vulnerability Assessment and Assets at Risk

This section identifies the Agency's total assets at risk, including values at risk, populations at risk, critical facilities and infrastructure, natural resources, and historic and cultural resources. Growth and development trends are also presented for the Agency. This data is not hazard specific, but is representative of total assets at risk within the Agency.

#### *Assets at Risk and Critical Facilities*

This section considers the PCWA's assets at risk, with a focus on key Agency assets such as critical facilities, infrastructure, and other Agency assets and their values. With respect to Agency assets, the majority of these assets are considered critical facilities as defined for this Plan. Critical facilities are defined for this Plan as:

*Any facility, including without limitation, a structure, infrastructure, property, equipment or service, that if adversely affected during a hazard event may result in severe consequences to public health and safety or interrupt essential services and operations for the community at any time before, during and after the hazard event.*

This definition is further refined by separating out three classes of critical facilities:

*Class 1 facilities include those facilities that contribute to command, control, communications and computer capabilities associated with managing an incident from initial response through recovery.*



*Class 2 facilities include those facilities that house Emergency Services capabilities.*

*Class 3 facilities are those facilities that enable key utilities and can be used as evacuation centers/shelters/mass prophylaxis sites, etc.*

Additional information on the three classes of critical facilities is described further in Section 4.3.1 of the Base Plan.

Table R-4 lists critical facilities and other Agency assets identified by the Agency Planning Team as important to protect in the event of a disaster. PCWA's physical assets, valued at over \$3.2 billion, consist of the buildings and infrastructure to support the Agency's operations.

***Table R-4 PCWA Critical Facilities, Infrastructure, and Other Agency Assets***

PCWA Water System		Facility Criticality		
Asset type	Class	Replacement Value	Employees	Hazard Specific
Water Conveyance	Class 2 & 3	\$ 933,285,736	68	Earthquake, Dam Failure, Water Shortage, Flood, Landslide, Levee Failure, Heavy Rains & Storms, Wildfire and Hazardous Material Exposure
Misc.	Class 2 & 3	\$ 1,818,975		Earthquake, Dam Failure, Water Shortage, Flood, Landslide, Levee Failure, Heavy Rains & Storms, Wildfire and Hazardous Material Exposure
Offices	Class 2 & 3	\$ 21,518,518	110	Earthquake, Heavy Rains & Storms, Wildfire, Pandemic and Hazardous Material Exposure
Pump Stations	Class 2 & 3	\$ 39,754,605		Earthquake, Water Shortage, Flood, Heavy Rains & Storms, Wildfire and Hazardous Material Exposure
Water Tanks	Class 2 & 3	\$ 18,176,851		Earthquake, Water Shortage, Flood, Landslide, Heavy Rains & Storms, Wildfire and Hazardous Material Exposure
Water Treatment Plants	Class 2 & 3	\$ 380,728,064	38	Earthquake, Dam Failure, Water Shortage, Flood, Landslide, Levee Failure, Heavy Rains & Storms, Wildfire, Hazardous Material Exposure, and Pandemic
<b>Grand Total</b>		<b>\$ 1,395,282,748</b>	<b>216</b>	
PCWA Power System				
Asset Type		Replacement Value	Employees	Hazard Specific
Dams/Reservoirs	Class 2 & 3	\$ 1,005,509,000		Earthquake, Dam Failure, Water Shortage, Flood, Landslide, Levee Failure, Heavy Rains & Storms, Wildfire and Hazardous Material Exposure
Misc Infrastructure	Class 2 & 3	\$ 1,746,000		Earthquake, Dam Failure, Water Shortage, Flood, Landslide, Levee Failure, Heavy Rains & Storms, Wildfire and Hazardous Material Exposure
Office Residential	Class 2 & 3	\$ 15,748,000		Earthquake, Dam Failure, Water Shortage, Landslide, Heavy Rains & Storms, Wildfire.
Power Systems	Class 2 & 3	\$ 766,466,000		Earthquake, Dam Failure, Water Shortage, Flood, Landslide, Levee Failure, Heavy Rains & Storms, Wildfire and Hazardous Material Exposure, Freeze & Snow, High Winds, Tree Mortality
Tunnels	Class 2 & 3	\$ 37,597,000		Earthquake, Dam Failure, Flood, Landslide, Heavy Rains & Storms, Wildfire and Hazardous Material Exposure
<b>Grand Total</b>		<b>\$ 1,827,066,000</b>	<b>35</b>	

Source: PCWA

## ***Populations Served***

PCWA serves both incorporated and unincorporated areas of the County. Out of the more than 380-thousand people in Placer County, PCWA is by far the largest water supplier with some 37-thousand treated water accounts. More than 4-thousand untreated water accounts (Agricultural) and 14 wholesale water distribution accounts where water is provided to other water service areas.

## *Natural Resources*

PCWA has a variety of natural resources of value to the Agency. These natural resources parallel that of Placer County as a whole. Additionally, PCWA is actively involved in various watershed areas including the American River, Yuba and Bear rivers, the Lake Tahoe/Truckee River system, the Central Valley Project, and Bay/Delta system.

## *Historic and Cultural Resources*

PCWA has a variety of historic and cultural resources of value to the Agency including the old State Route Highway 40 Memorial and Heritage Farm House at 10681 Ophir Road. Additionally, many of the flumes in the canal system have local cultural significance and are beloved by the community. The Agency has ties to both the gold mining and agricultural history of the area.

## *Growth and Development Trends*

General growth in the Agency somewhat parallels that of the Placer County Planning Area as a whole. Information can be found in Section 4.3.1 of the Base Plan.

## *Specific Agency Planning and Development*

In 2017 PCWA completed an update to the Water Connection Charge Cost Study which proposed a list of forty infrastructure projects that included the Ophir Water Treatment Plant (WTP), 24 miles of pipelines, six storage tanks, emergency standby power generation at the American River and Ophir Road Pump Stations, and three groundwater wells. The Ophir Water Treatment Plant Program is based on 30 million gallons a day (mgd) and is planned to be constructed in 10 mgd phases as demands develop in Placer County. The 2017 capital plan has provisions for capacity beyond this development horizon of 30 MGD of capacity from Ophir WTP. One of these provisions includes oversizing of the transmission pipelines from Ophir WTP towards west Placer County. The Ophir WTP will be designed to the building codes to adequately address seismic activity and will include back generators at the plant and all other critical facilities built under this program. Since 2016, three of these projects have been completed and three other projects are currently under construction in 2021. The Ophir Program considered the available general plans for Placer County, the Town of Loomis, City of Lincoln, and City of Rocklin when determining how to serve future growth in the region.

## **R.5.3. Vulnerability to Specific Hazards**

This section provides the vulnerability assessment, including any quantifiable loss estimates, for those hazards identified above in Table R-3 as high or medium significance hazards. Impacts of past events and vulnerability of the Agency to specific hazards are further discussed below (see Section 4.1 Hazard Identification in the Base Plan for more detailed information about these hazards and their impacts on the Placer County Planning Area). Methodologies for evaluating vulnerabilities and calculating loss estimates are the same as those described in Section 4.3 of the Base Plan.

An estimate of the vulnerability of the Agency to each identified priority hazard, in addition to the estimate of likelihood of future occurrence, is provided in each of the hazard-specific sections that follow. Vulnerability is measured in general, qualitative terms and is a summary of the potential impact based on past occurrences, spatial extent, and damage and casualty potential. Vulnerability is categorized into the following classifications:

- **Extremely Low**—The occurrence and potential cost of damage to life and property is very minimal to nonexistent.
- **Low**—Minimal potential impact. The occurrence and potential cost of damage to life and property is minimal.
- **Medium**—Moderate potential impact. This ranking carries a moderate threat level to the general population and/or built environment. Here the potential damage is more isolated and less costly than a more widespread disaster.
- **High**—Widespread potential impact. This ranking carries a high threat to the general population and/or built environment. The potential for damage is widespread. Hazards in this category may have occurred in the past.
- **Extremely High**—Very widespread with catastrophic impact.

Depending on the hazard and availability of data for analysis, this hazard specific vulnerability assessment also includes information on values at risk, critical facilities and infrastructure, populations at risk, and future development.

### *Agriculture Hazards*

**Likelihood of Future Occurrence**—Occasional

**Vulnerability**—Medium

### **Hazard Profile and Problem Description**

Before its rapid population growth in the 1970s and 1980s, Placer County was known as an agricultural and timber-producing county. Agriculture and timber production are still important sectors of the County's economy; however, manufacturing, recreation, and service industries have increased in economic importance. Agricultural lands continue to be at risk to development based on population growth projections for the County. In western Placer County, land traditionally used for agricultural purposes lies near existing cities and is expected to accommodate much of this population increase. While its agricultural land is threatened, Placer County retains a significant amount of agricultural land where the economy is intact and where farmers are a real presence in the community.

According to the HMPC, agricultural losses occur on an annual basis and are usually associated with severe weather events, including heavy rains, floods, freeze, heat, and drought. Wildfire and other hazards can also affect agricultural lands. The 2018 State of California Multi-Hazard Mitigation Plan attributes most of the agricultural disasters statewide to drought, freeze, and insect infestations. Other agricultural hazards include fires, crop and livestock disease, insects, and noxious weeds.

In addition to severe weather, invasive species can affect the agricultural industry in the County. Invasive species are organisms that are introduced into an area beyond their natural range and become a pest in the new environment. This hazard addresses the issues related to invasive pests including that pose a significant

threat to the agricultural industry and are therefore a concern in the Placer County Planning Area. This hazard does not address pests and plants that cause impacts to human health, as those issues are addressed in other planning mechanisms in the County.

### **Location and Extent**

There is no scale that measures agricultural hazards. Agriculture in the County is at risk to many hazards: insects, weeds, severe weather, as well as downturns in commodity prices. Each of these has a different duration and speed of onset. Some, such as freeze, can have a short onset and a short duration. Drought can have a long onset and long duration. Insects and weeds can have short or long onset, and short or long durations. All agricultural losses can have a significant impact on affected communities.

### **Past Occurrences**

There have been no state or federal FEMA disasters in the County related to agricultural hazards. There have been multiple USDA Secretarial Disaster Declarations, as shown on Table 4-6 of the Base Plan.

### **Vulnerability to and Impacts from Agricultural Pests and Diseases**

According to the USDA, every year natural disasters, such as droughts, extreme heat and cold, floods, fires, hail, landslides, and tornadoes, challenge agricultural production. Because agriculture relies on the weather, climate, and water availability to thrive, it is easily impacted by natural events and disasters. Agricultural impacts from natural events and disasters most commonly include contamination of water bodies, loss of harvest or livestock, increased susceptibility to disease, and destruction of irrigation systems and other agricultural infrastructure. These impacts can have long lasting effects on agricultural production including crops, forest growth, and arable lands, which require time to mature. More specific impacts by hazard were listed in Section 4.3.6 of the Base Plan.

In addition to threats to agriculture from weather and other natural hazard events, agriculture in the County is at risk from insects, pests, and noxious weeds. Establishment of an invasive species would be detrimental to the agricultural industry of Placer County because of product losses, stringent quarantine regulations, loss of exporting opportunities and increased treatment costs. The introduction of exotic plants influences wildlife by displacing forage species, modifying habitat structure—such as changing grassland to a forb-dominated community—or changing species interactions within the ecosystem.

In addition, invasive weeds can increase fire risk in the County.

While PCWA does not have any direct agricultural risk as far as crops, approximately 2/3 of the water supplied by the agency is used for agricultural and the Agency is highly involved with water conservation and planning for the agricultural Industry. About 11% of employment is attributed to Agriculture in Placer County, with marked growth in small farms and “farm to fork” operations. The loss of PCWA’s ability to provide water through our canal system would be devastating to agriculture in the County. The loss of Agriculture in the Western part of the County would equate to a significant revenue loss for the Agency.

## Assets at Risk

Financial and economic community assets are at risk

## *Avalanche*

**Likelihood of Future Occurrence**—Occasional

**Vulnerability**—Low

## Hazard Profile and Problem Description

According to the Sierra Avalanche Center, avalanches occur when loading of new snow increases stress at a rate faster than strength develops, and the slope fails. Avalanches are a rapid down-slope movement of snow, ice and debris triggered by ground shaking, sound, or human or animal movement. Avalanches consist of a starting zone where the ice or snow breaks loose, a track which is the grade or channel the debris slides down and a run-out zone where the snow is deposited.

Critical stresses develop more quickly on steeper slopes and where deposition of wind-transported snow is common. The vast majority of avalanches occur during and shortly after storms. This hazard generally affects a small number of people, such as snowboarders, skiers, and hikers who venture into backcountry areas during or after winter storms. Roads and highway closures, damaged structures, and destruction of forests are also a direct result of avalanches.

## Location and Extent

The two primary factors impacting avalanche activity are weather and terrain. Large, frequent storms deposit snow on steep slopes to create avalanche hazards. Additional factors that contribute to slope stability are the amount of snow, rate of accumulation, moisture content, wind speed and direction and type of snow crystals. Topography also plays a vital role in avalanche dynamics. Slope angles between 30 to 45 degrees are optimal for avalanches. The risk of avalanches decreases on slope angles below 30 degrees. At 50 or more degrees they tend to produce sluff or loose snow avalanches that account for only a small percentage of avalanche deaths and property damage annually.

Areas prone to avalanche hazards include hard to access areas deep in the backcountry and those in the more developed higher elevations of the County in the Tahoe basin. Avalanche hazards exist in eastern Placer County where combinations of the above criteria occur. The Avalanche hazard is low, but exists as a challenge for access to the Middle Fork Power Project on the Eastern side of the County.

## Past Occurrences

There have been no state or federal disasters in the County related to avalanche. No events of past avalanche have affected the Agency.



## Vulnerability to and Impacts from Avalanche

Avalanches occur when the weight of new snow increases stress faster than strength of the snowpack develops, causing the slope to fail. Avalanche conditions develop more quickly on steeper slopes (located in the eastern portions of the County) and where wind-blown snow is common. Avalanche impacts vary, but include risk to property, injury, or death. Avalanches generally affect a few snowboarders, skiers, and hikers who venture into backcountry areas during or after winter storms. Avalanches cause road closures, and can damage structures and forests.

The Power operations in the South Eastern part of the County are located in wilderness areas and most of the operations are at elevations between 2,000 and 5,000 feet. Assets and transportation routes can be profoundly impacted by snow and avalanche. While the Agency owns four snow-cats, safety and mobility can be significantly impacted by snow. This is further compounded by the remoteness of the area and spotty communications. This hazard may be a life safety and operational issue for staff, but is not likely to result in a long-term catastrophic loss to the Agency.

### Assets at Risk

Agency assets at risk include staff, facilities and routes of access to the Middle Fork Power Project.

## Climate Change

**Likelihood of Future Occurrence**—Likely

**Vulnerability**—High

## Hazard Profile and Problem Description

Climate change adaptation is a key priority of the State of California. The 2018 State of California Multi-Hazard Mitigation Plan stated that climate change is already affecting California. Sea levels have risen by as much as seven inches along the California coast over the last century, increasing erosion and pressure on the state's infrastructure, water supplies, and natural resources. The State has also seen increased average temperatures, more extreme hot days, fewer cold nights, a lengthening of the growing season, shifts in the water cycle with less winter precipitation falling as snow, and earlier runoff of both snowmelt and rainwater in the year. In addition to changes in average temperatures, sea level, and precipitation patterns, the intensity of extreme weather events is also changing.

Specifically, climate change in relation to water (too much, or too little) directly impact natural resources, water management, Agency operations and facilities. In 2017 a historic winter the American river rose and severely damaged the American River Pump Station, inundating rains caused the Pulpmill and Middle Fiddler Green canals to erode and fail, as well as other road and property damage from high waters. Storms in 2017 and 2018 caused rockslides on the Blacksmith Flat Road and Interbay Road to be inaccessible. There were additional communication and power lines that failed due to storm damage. This can be contrasted with the historic Drought between 2014 and 2017 where historic levels of low precipitation and snowpack were compounded by hot days, bark beetles killing off trees and epic wildfires. Ecological issues occur with river temperatures warming and more water is needed to prevent the salination of rivers as the oceans rise. Crops with high moisture requirements were abandoned including some nut tree crops that

take years to restore. Ground water well pumping increased in the agricultural areas depleting and sometimes collapsing groundwater stores. Ultimately there is an imbalance of available fresh water to meet the long-term future demand.

### Location and Extent

Climate change is a global phenomenon. It is expected to affect the whole of the Agency, Placer County, and State of California. There is no scale to measure the extent of climate change. Climate change exacerbates other hazards, such as drought, extreme heat, flooding, wildfire, and others. The speed of onset of climate change is very slow. The duration of climate change is not yet known but is feared to be tens to hundreds of years.

### Past Occurrences

Climate change has not been directly cited as a specific declared disaster hazard, but is often used to explain the amplification of severe weather hazards. The Agency and HMPC members did, however, note that in Placer County, the strength of storms does seem to be increasing and the temperatures seem to be getting hotter. Hotter temperatures, combined with recent drought conditions, exacerbates the potential for damaging wildfires, drought, and tree mortality. Storm magnification has led to flooding, landslides, increasing severe weather patterns. With increased storm a precipitation there is potential for the increased probability for future levee and dam failure.

### Vulnerability to and Impacts from Climate Change

The California Adaptation Planning Guide (APG) prepared by California OES and CNRA was developed to provide guidance and support for local governments and regional collaboratives to address the unavoidable consequences of climate change. California's APG: Understanding Regional Characteristics has divided California into 11 different regions based on political boundaries, projected climate impacts, existing environmental setting, socioeconomic factors and regional designations. Placer County falls within the North Sierra Region characterized as a sparsely settled mountainous region where the region's economy is primarily tourism-based. The region is rich in natural resources, biodiversity, and is the source for the majority of water used by the state. This information can be used to guide climate adaptation planning in the Agency and Placer County Planning Area.

The California APG: Understanding Regional Characteristics identified the following impacts specific to the North Sierra region in which the Placer County Planning Area is part of:

- Agricultural Hazard
- Temperature increases
- Decreased precipitation
- Dam & Levee failures
- Drought and water shortage
- Flooding
- Landslides & Debris Flows
- Increased or severe precipitation or weather events
- Reduced snowpack

- Reduced tourism
- Ecosystem change
- Sensitive species stress
- Tree Mortality
- Wildfire
- Public Safety Power Shutoff – energy reliability

### **Assets at Risk**

All Agency assets are at risk from climate change in relation to water being the principal function and purpose of the Agency and in which all production is derived. Additionally, increased temperatures impact water use, and availability. Amplified weather patterns put facilities are risk from severe weather hazards of all kinds and secondary hazards and exposures such as wildfire.

### ***Dam Failure***

**Likelihood of Future Occurrence**–Unlikely  
**Vulnerability**–High

### **Hazard Profile and Problem Description**

Dams are manmade structures built for a variety of uses including flood protection, power generation, agriculture, water supply, and recreation. When dams are constructed for flood protection, they are usually engineered to withstand a flood with a computed risk of occurrence. For example, a dam may be designed to contain a flood at a location on a stream that has a certain probability of occurring in any one year. If prolonged periods of rainfall and flooding occur that exceed the design requirements, that structure may be overtopped or fail. Overtopping is the primary cause of earthen dam failure in the United States.

### **Location and Extent**

Dam failure is a natural disaster from two perspectives. First, the inundation from released waters resulting from dam failure is related to naturally occurring floodwaters. Second, a total dam failure would most probably happen as a consequence of the natural disaster triggering the event, such as an earthquake. There is no scale with which to measure dam failure. However, Cal DWR Division of Safety of Dams (DOSD) assigns hazard ratings to dams within the State that provides information on the potential impact should a dam fail. The following two factors are considered when assigning hazard ratings: existing land use and land use controls (zoning) downstream of the dam. Dams are classified in four categories that identify the potential hazard to life and property: Low, Significant, High, and Extremely High. These were discussed in more detail in Section 4.3.9 of the Base Plan.

While a dam may fill slowly with runoff from winter storms, a dam break has a very quick speed of onset. The duration of dam failure is generally not long – only as long as it takes to empty the reservoir of water the dam held back. The danger would continue for as long as the flood waters from the dam failure took to drain downstream. However, the damage to the Agency operations could be catastrophic. While dam failure inundation maps indicate much of the inundation area is rural undeveloped land, there are bridges and PCWA assets that would potentially suffer severe damage.

## Past Occurrences

There has been no federal or state disaster declarations for dam failure in the County. The only known dam failure for the Agency occurred in 1964 When torrential rains caused a failure of the Hell Hole Dam that was under construction and only 20% completed at the time. There were several small bridge failures and a bridge failure at the American River Confluence.

## Vulnerability to and Impacts from Dam Failure

Dam failure flooding would vary by community depending on which dam fails and the nature and extent of the dam failure and associated flooding. Impacts to the Agency from a dam failure flood could include loss of life and injury, flooding and damage to property and structures, damage to critical facilities and infrastructure, loss of natural resources, and all other flood related impacts. Evacuations and associated economic losses could also be significant.

The Power Division has four dams and three smaller diversions. A dam failure at the top of the Watershed theoretically could cascade through various facilities downstream causing additional loss or failures. Life safety concerns include gold claims and recreational use downstream, however immediate downstream exposure does not include densely populated residential areas. Large property concerns include bridges close to the American River Confluence that could be affected. Folsom Lake would be affected proportionately. Dam failure could lead to a catastrophic operational loss for the agency. The Division of Safety of Dams (DSOD) rates the Power Division dams in the following categories: (2) extremely high downstream hazard, (1) significant downstream hazard and (1) a low downstream hazard.

The Water Division has nine lakes/reservoirs used for water storage and control. One of which is completely dry and abandoned. All have small dams or flow control. The Division of Safety of Dams (DSOD) rates the Water Division dams as: (1) a high downstream hazard, (3) significant downstream hazard and (1) a low downstream hazard. Most are in rural modestly populated areas.

PG&E also operates at least four dams or reservoirs that significantly impact our water supply and service area.

## Assets at Risk

Downstream assets such as powerhouses, other dams and water intake structures are at risk from dam failure. Other public infrastructure assets such as bridges are immediately in the downstream inundation area.

## *Drought & Water Shortage*

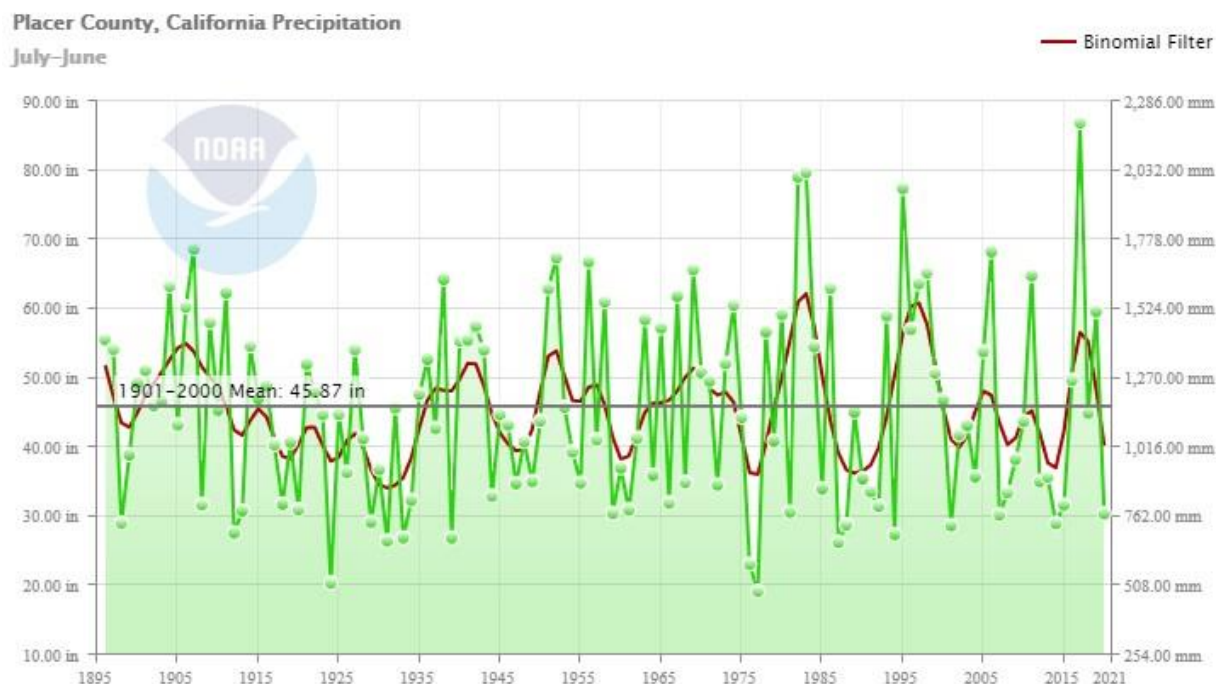
**Likelihood of Future Occurrence**–Highly Likely

**Vulnerability**–High

## Hazard Profile and Problem Description

Drought is a complex issue involving many factors—it occurs when a normal amount of precipitation and snow is not available to satisfy an area’s usual water-consuming activities. Historically, California has experienced as many as twelve droughts, since being formally recorded in the mid-1800s. Typically a drought will last from two to seven years. Perhaps the worst was between 1912 and 1934 (as shown on Figure R-2) where over a span of twenty-two years there was only five years of above average precipitation. California having a population of more than 39-million people, and as a major agricultural producer can suffer severe economic and environmental impact. Drought may be amplified by weather conditions; economic or political actions; and/or population and farming. Drought can often be defined regionally based on its effects. Drought is different than many of the other natural hazards in that it is not a distinct event and usually has a slow onset. Drought can severely impact a region both physically and economically. Drought affects different sectors in different ways and with varying intensities. Adequate water is the most critical issue and is critical for environmental sustenance, agriculture, manufacturing, tourism, recreation, and commercial and domestic consumption. As the population in the area continues to grow, so will the demand for water.

*Figure R-2 Placer County Precipitation*



Source: NOAA National Centers for Environmental information, Climate at a Glance: County Time Series, published April 2021, retrieved on 3/29/2021 from <https://www.ncdc.noaa.gov/cag/>

## Location and Extent

Drought and water shortage is normally a regional phenomenon. The County, as well as the Agency, is at risk and water supplies impact the remainder of the State. The US Drought Monitor categorizes drought conditions with the following scale:



- None
- D0 – Abnormally dry
- D1 – Moderate Drought
- D2 – Severe Drought
- D3 – Extreme drought
- D4 – Exceptional drought

Drought has a slow speed of onset and a variable duration. Drought can last for a short period of time, which is not likely to impact water storage carry over. Alternatively, a drought may extend for years depleting water storage and availability and creating a water crisis, potentially extending throughout the State and severely impacting agriculture and the economy as a whole. Current drought conditions in the Agency and the County are shown in Section 4.3.10 of the Base Plan.

### Past Occurrences

There has been one state and one federal disaster declaration due to drought since 1950. This can be seen in Table R-5.

*Table R-5 Placer County – State and Federal Disaster Declarations Summary 1950-2020*

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Drought	1	2014-2017	1	1977

Source: Cal OES, FEMA

Since drought is a regional phenomenon, past occurrences of drought for the Agency are the same as those for the County and includes 5 multi-year droughts over an 85-year period. Details on past drought occurrences can be found in Section 4.3.10 of the Base Plan.

The historic drought between 2012 and 2016 resulted in a reduction in the local water supply; however, the drought resulted in more significant demand reductions forced by regulatory mandates. In general, summer 2015 water use has been cut by over 30% relative to 2013 levels. Economically the drought has impacted water sales reducing revenues for the Agency. Prolonged drought impacts capital improvement plans and operations over time. Agriculture in the region suffered a significant economic impact from reductions. The most significant threat to local economy is the concern of major populations not being adequately served from Folsom Lake due to the water surface going below the intake level. There was great risk of this occurring in both 2014 and 2015, but reservoir operations were modified just in time both years to prevent this crisis. The issue is complex statewide water management problem beyond the scope of just Placer County. Droughts can bring on conservation and control measures by the State Water Resources Control Board that impact water consumption and Agency revenues.

*Figure R-3 Folsom Lake in 2014*



Source: PCWA

### **Vulnerability to and Impacts from Drought and Water Shortage**

Based on historical information, the occurrence of drought in California, including the Agency, is cyclical, driven by weather patterns. Drought has occurred in the past and will occur in the future. Periods of actual drought with adverse impacts can vary in duration, and the period between droughts can be extended. Although an area may be under an extended dry period, determining when it becomes a drought is based on impacts to individual water users. Drought impacts are wide-reaching and may be economic, environmental, and/or societal. Tracking drought impacts can be difficult.

The most significant qualitative impacts associated with drought in the Placer County Planning Area are those related to water intensive activities such as agriculture, wildfire protection, municipal usage, commerce, tourism, recreation, and wildlife preservation. Mandatory conservation measures are typically implemented during extended droughts. Drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding. With a reduction in water, water supply issues based on water rights becomes more evident. Climate change may create additional impacts to drought and water shortage in the County and the Agency.

During periods of drought, vegetation can dry out which increases fire risk. Drought that occurs during periods of extreme heat and high winds can cause Public Safety Power Shutoff (PSPS) events to be declared in the County. More information on power shortage and failure can be found in the Wildfire Section below, as well as in Section 4.3.2 of the Base Plan.

Placer County Water Agency is fortunate to be at the top of the watershed with plentiful water storage under normal circumstances. However; the State Water Resources Control Board can implement conservation regulation and control that can severely impact the local conditions and use of water.

## Assets at Risk

Economically the entire Agency is impacted. Power generation is reduced and revenues from water sales are decreased. The result is that capital projects may be postponed for delivery infrastructure - increasing the potential for failure. Additional effort must go into water management, public awareness and political involvement. Ultimately cascading impacts include increased risk of wildfire, energy disruption and economic challenges.

### *Flood: 1%/0.2% Annual Chance*

**Likelihood of Future Occurrence**—Occasional/Unlikely

**Vulnerability**—High

## Hazard Profile and Problem Description

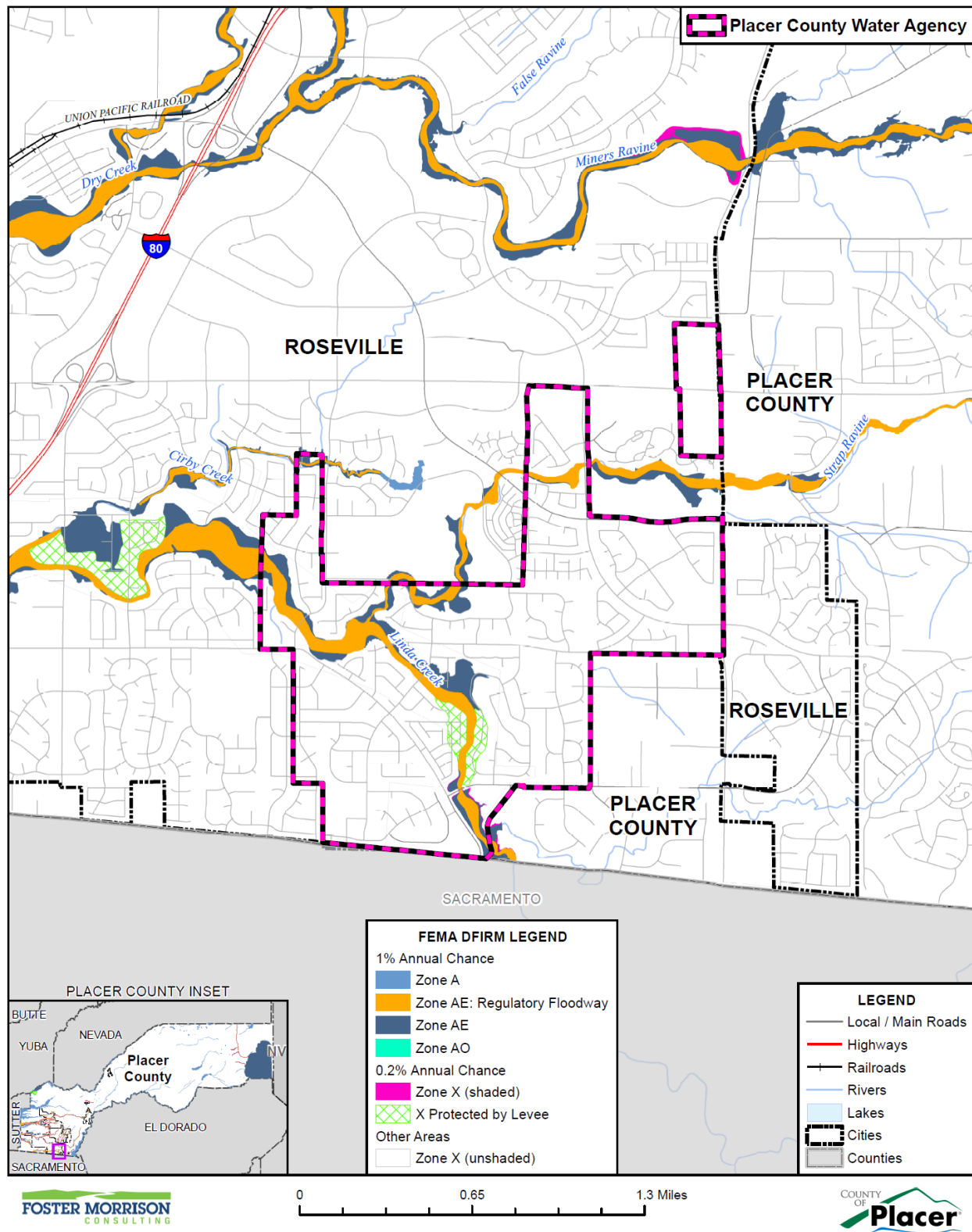
This hazard analyzes the FEMA DFIRM 1% and 0.2% annual chance floods. These tend to be the larger floods that can occur in the County or in the Agency and have caused damages in the past. Flooding is a significant problem in Placer County and the Agency. Historically, the Agency has been at risk to flooding primarily during the winter and spring months when river systems in the County swell with heavy rainfall and snowmelt runoff. Normally, storm floodwaters are kept within defined limits by a variety of storm drainage and flood control measures. Occasionally, extended heavy rains result in floodwaters that exceed normal high-water boundaries and cause damage.

As previously described in Section 4.3.12 of the Base Plan, the Placer County Planning Area and the PCWA have been subject to historical flooding.

## Location and Extent

The PCWA has areas located in the 1% annual chance floodplain. This is seen in Figure R-4.

Figure R-4 PCWA – FEMA DFIRM Flood Zones



Data Source: FEMA DFIRM 11/2/2018, Placer County GIS, Cal-Atlas, NVBLM; Map Date: 2021.

Table R-6 details the DFIRM mapped flood zones within the 1% annual chance flood zone as well as other flood zones located within the Agency.

*Table R-6 PCWA– DFIRM Flood Hazard Zones*

Flood Zone	Description	Flood Zone Present in the Agency
A	Areas subject to inundation by the 1% annual-chance flood event generally determined using approximate methodologies. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply.	
AE	Areas subject to inundation by the 1% annual-chance flood event determined by detailed methods. Base Flood Elevations (BFEs) are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply.	X
AE – Regulatory Floodway	Areas subject to inundation by the 1% annual-chance flood event determined by detailed methods. Base Flood Elevations (BFEs) are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply. Different from AE in that it adds the water course and adjacent lands that must be reserved in order to discharge the base flood without increasing the water surface elevation by more than one foot.	X
AH	An area inundated by 1% annual chance flooding (usually an area of ponding), for which BFEs have been determined; flood depths range from 1 to 3 feet	
AO	Areas subject to inundation by 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between one and three feet	
Shaded X	500-year flood the areas between the limits of the 1% annual chance flood and the 0.2-percent-annual-chance (or 500-year) flood	
X Protected by Levee	An area determined to be outside the 500-year flood and protected by levee from 100-year flood	
X	Areas outside of known floodplains.	X

Source: FEMA

Additionally, flood extents can generally be measured in volume, velocity, and depths of flooding. Expected flood depths in the Agency vary, depending on the nature and extent of a flood event; specific depths are unknown. Flood durations in the Agency tend to be short to medium term, or until either the storm drainage system can catch up or flood waters move downstream. Flooding in the Agency tends to have a shorter speed of onset, due to the amount of water that flows through the Agency.

### Past Occurrences

A list of state and federal disaster declarations for Placer County from flooding is shown on Table R-7. These events also likely affected the Agency to some degree.



**Table R-7 Placer County – State and Federal Disaster Declarations from Flood 1950-2020**

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Flood (including heavy rains and storms)	16	1950, 1955, 1958 (twice), 1962, 1963, 1969, 1973, 1980, 1983, 1986, 1995 (twice), 1997, 2008, 2017	13	1955, 1958, 1962, 1964, 1969, 1983, 1986, 1995 (twice), 1997, 2006 (twice), 2017

Source: Cal OES, FEMA

Historical amounts of precipitation fell in January and February of 2017, along with antecedent conditions from a wet October and December led to high river levels with many forecast points along the major rivers reaching monitor or even flood-stage and above. Some rivers reached record or near-record levels and there was flooding along many creeks and streams. ([CNRFC - Storm Summaries - Jan and Feb 2017 \(noaa.gov\)](#)) Local and State and Federal disasters were declared. PCWA suffered more than one-million dollars in losses to six Agency facilities with the American River Pumpstation Intake structures being completely submerged at a bend in the river. Additional difficulties and claims from canal run-off and spills were managed within the Agency.

**Figure R-5 American River Pump Station**



Source: PCWA

## Vulnerability to and Impacts from Flood

Floods have been a part of the Agency’s historical past and will continue to be so in the future. Dam safety plans anticipate historical flooding, and operations adjust to rising storm water. As seen by the Afterbay Dam gates on the Middle Fork of the American River on Figure R-6. The gates are in the full-open position and there was ample capacity for 2017 storm waters. One of the Agency challenges brought on by storm waters is managing debris and sediment both of which have been increased by wildfires. Sediment decreasing the reservoir capacity, and debris endangering the dams and physical structures. Managing these two issues can be dangerous during a storm and lead to tens of millions of dollars of remediation that can last years later, after the storms.

*Figure R-6 Afterbay Dam*



Source: PCWA

Heavy rains and storms also create canal management issues. Debris washed, blown and fallen into the canal system create a backup of water crating over topping of the canals in unintended areas. The over topping of the canals can lead to the erosion, landslides and a failure of the canal. Spillways for the management of the canals have always been there, but with increasing development the heavy spilling of the canals can surprise landowners who are in the spill channel. The greater the storm run off the more spillways and the greater flow must occur.

*Figure R-7 Pulp Mill Canal 2017*



Source: PCWA

During winter months, long periods of precipitation and the timing of that precipitation are critical in determining the threat of flood, and these characteristics further dictate the potential for widespread

structural and property damages. Predominantly, the effects of flooding are generally confined to areas near the waterways of the County. As waterways grow in size from local drainages, so grows the threat of flood and dimensions of the threat. This threatens structures in the floodplain. Structures can also be damaged from trees falling as a result of water-saturated soils. Electrical power outages happen, and the interruption of power causes major problems. Loss of power is usually a precursor to closure of governmental offices and community businesses. Roads can be damaged and closed, causing safety and evacuation issues. People may be swept away in floodwaters, causing injuries or deaths.

Floods are among the costliest natural disasters in terms of human hardship and economic loss nationwide. Floods can cause substantial damage to structures, landscapes, and utilities as well as life safety issues. Floods can be extremely dangerous, and even six inches of moving water can knock over a person given a strong current. During a flood, people can also suffer heart attacks or electrocution due to electrical equipment short outs. Floodwaters can transport large objects downstream which can damage or remove stationary structures. Ground saturation can result in instability, collapse, or other damage. Objects can also be buried or destroyed through sediment deposition. Floodwaters can also break utility lines and interrupt services. Standing water can cause damage to crops, roads, foundations, and electrical circuits. Direct impacts, such as drowning, can be limited with adequate warning and public education about what to do during floods. Other problems connected with flooding and stormwater runoff include erosion, sedimentation, degradation of water quality, loss of environmental resources, and economic impacts.

Placer County Water Agency does not handle storm water systems or reclaimed water. The storm exposures mainly arise from open water supply systems including canals and flumes. During major storm events water storage being released into the canal system is restricted and the agency opens spillway relief systems to allow for extra capacity. The main hazard that remains is debris swept into the canal system that potentially collects to block free flowing water. This can cause overtopping. Crews regularly patrol during storms to prevent debris build up at trash-racks and culverts.

The American River Pump Station has some degree of vulnerability during a 200 to 500 year storm due to its location along the Middle Fork of the American River.

The Power Project has potential storm exposure from over topping of dams at the top of the Middle Fork Project and to power plants along the river through descending elevations. Past forest fires compound watershed hazards with increased sedimentation causing water levels to rise. Additionally, floating forest-fire debris can enter into the watershed and cause damage and potential destruction to dams, diversions and related facilities along the river.

### **Assets at Risk**

The majority of operational hazards are at or along rivers or canal systems. All Agency assets with the exception of business offices would at some degree of risk from flooding.

## *Flood: Localized Stormwater Flooding*

**Likelihood of Future Occurrence**–Highly Likely

**Vulnerability**–Medium

### **Hazard Profile and Problem Description**

Flooding occurs in areas other than the FEMA mapped 1% and 0.2% annual chance floodplains. Localized, stormwater flooding occurs throughout the County during the rainy season from November through April. Prolonged heavy rainfall contributes to a large volume of runoff resulting in high peak flows of moderate duration. Heavy snowpack with unseasonably warm high altitude temperatures can also create rapid snow melt and extreme run off conditions.

### **Location and Extent**

The PCWA is subject to localized flooding throughout the Agency. Expected flood depths in the Agency vary by location. Flood durations in the Agency tend to be short to medium term, or until either the storm drainage system can catch up or flood waters move downstream. California is prone to atmospheric rivers that dump copious amounts of rain over short periods of time. Localized flooding in the Agency tends to have a shorter speed of onset, especially when antecedent rainfall has soaked the ground and reduced its capacity to absorb additional moisture.

Typical locations of concern are the management of dams, levies, and canal systems where debris or sedimentation have created areas of blockage or decreased capacity. As in the above 1%/2% flood years canal systems can be overtopped in low areas when there is intense rain in combination with fall debris. Overtopping can erode the embankments jeopardizing the integrity of the canal. Guniting the canal system can enhance the stability of earthen canals and the Agency budgets a million dollars a year to repair or guniting earthen canals.

As the County becomes more increasingly populated, and a run of dry years has become a collective memory; the active use of historic spillways can be surprising to those that may have just moved to the area or who have repurposed land in a spillway that may have been dry for years. It is critical that structures or uses of spillway land be restricted.

### **Past Occurrences**

There have been no federal or state disaster declarations in the County due to localized flooding. The Agency noted the following past occurrences of localized flooding:

- Winters of 2016, 2017, and 2019 all saw above average precipitation levels each with incidence of atmospheric rivers or narrow corridors of intensely concentrated moisture hitting the Placer County area.

### **Vulnerability to and Impacts from Localized Flooding**

Historically, much of the growth in the Agency and County has occurred adjacent to streams, resulting in significant damages to property, and losses from disruption of community activities when the streams



overflow. Additional development in the watersheds of these streams affects both the frequency and duration of damaging floods through an increase in stormwater runoff.

Primary concerns associated with stormwater flooding include life safety issues and impacts to property and to infrastructure that provides a means of ingress and egress throughout the community. Ground saturation can result in instability, collapse, or other damage to trees, structures, roadways and other critical infrastructure. Objects can also be buried or destroyed through sediment deposition. Floodwaters can break utility lines and interrupt services. Standing water can cause damage to crops, roads, and foundations. Other problems connected with flooding and stormwater runoff include erosion, sedimentation, degradation of water quality, losses of environmental resources, and certain health hazards.

### **Assets at Risk**

Water management assets such as canal systems dams/reservoir and water side assets or access routes are all vulnerable to flood or flood debris, damage or resulting land or mudslides caused by flooding. Water damage liability claims and repairs may occur.

### ***Landslide, Mudslide, Debris Flows***

**Likelihood of Future Occurrence**–Likely

**Vulnerability**–High

### **Hazard Profile and Problem Description**

According to the California Geological Survey, landslides refer to a wide variety of processes that result in the perceptible downward and outward movement of soil, rock, and vegetation under gravitational influence. Common names for landslide types include slump, rockslide, debris slide, lateral spreading, debris avalanche, earth flow, and soil creep. Landslides may be triggered by both natural and human-induced changes in the environment that result in slope instability.

The susceptibility of an area to landslides depends on many variables including steepness of slope, type of slope material, structure and physical properties of materials, water content, amount of vegetation, and proximity to areas undergoing rapid erosion or changes caused by human activities. These activities include mining, construction, and changes to surface drainage areas. Landslide events can be determined by the composition of materials and the speed of movement. A rockfall is dry and fast while a debris flow is wet and fast. Regardless of the speed of the slide, the materials within the slide, or the amount of water present in the movement, landslides are a serious natural hazard.

Debris flows can also occur in some areas of the County and the Agency. These debris flows generally occur in the immediate vicinity of existing drainage swales or steep ravines. Debris flows occur when near surface soil in or near steeply sloping drainage swales becomes saturated during unusually heavy precipitation and begins to flow downslope at a rapid rate. Debris flows are also common during the rainy season in post fire areas.



## Location and Extent

Landslides, mudslides, and debris flows can affect certain areas of the Agency. The CGS has estimated that the risk varies across the Agency and has created maps showing risk variance. This risk variance falls into multiple categories. These are discussed in Section 4.3.14 of the Base Plan. According to the Agency Planning Team, risk varies within the Agency range from moderate to high. The speed of onset of landslide is often short, especially in post-wildfire burn scar areas, but it can also take years for a slope to creep and fail. Catastrophic landslide duration is usually short, though digging out and repairing landslide areas can take extensive effort with continued instability being problematic. Known problematic areas that are considered high risk are surveyed and monitored by the Agency, but this cannot be geographically all encompassing.

The Agency has identified several locations where rockfall is problematic and have installed deep anchors for slope stabilization and rockfall nets to protect critical assets and equipment. An example is shown in Figure R-8 above the Hell Hold Dam Road.

*Figure R-8 Rockfall Netting Above Hell Hole 2016*



Source: PCWA

Recent slides have blocked asset roads and hampered operations by prolonging access and endangering those crossing or working in the area.

## Past Occurrences

There have been no federal or state disaster declarations in the County from landslide. However, the Agency Planning Team noted three recent incidences of landslides. Figure R-9 shows a photo of the Blacksmith Flat Road. This was a slide that started in the winter of 2017. Blacksmith Flat Road is a Forest Service Road (FR-23.) The slide continues to hamper access to the upper reaches of the Middle Fork Project. It is considered an unpassable road and a safety hazard. As of the writing of this annex in early 2021, it is unsure when this road will be reopened.

*Figure R-9 Blacksmith Flat Road Landslide 2017*



Source: PCWA

Figure R-10 is a photo from the January 25, 2018 rockslide/landslide. I-Bay road was unsafe and blocked by slide debris, there was minor damage to an intake structure and the rock face had to be secured before opening the roadway. Interbay Road is owned and was repaired by the Agency under an insurance claim. Insurance coverage for access roads is no longer available to the Agency. The specific area is now secured by rock fall netting, but similar geology is present in multiple areas throughout the County. There are many bucolic roads that may have slide issues compounded by fires and big weather.

Landslide and debris flow hazards (not included in the Power System Project stated above under Flood Hazards) are under study or have not been specifically identified. The Water system does have eight smaller dams, reservoirs and levees. Many of the canal land and water easements are also located along slopes and in mountainous areas and are potentially susceptible to a damaging landslide event.



*Figure R-10 Interbay Road Slide*



Source: PCWA

### **Vulnerability to and Impacts from Landslide**

Although landslides are primarily associated with slopes greater than 15 percent, they can also occur in relatively flat areas and as cut-and-fill failures, river bluff failures, lateral spreading landslides, collapse of wine-waste piles, failures associated with quarries, and open-pit mines. Landslides may be triggered by both natural- and human-caused activity. Canal systems were often built on hillsides with flumes crossing valleys. Failure points can occur with unstable soils, human encroachment into the embankment, rodent activity and/or may be triggered by storm systems, water inundation and organic materials that make their way into the canal system.

Impacts from landslide, mudslides and debris flow may include structures, infrastructure, and impacts upon life safety. When a canal system fails from landslide the damage ranges from a variation in water supply

for drinking water and firefighting, to crop failure from lack of irrigation. While the agency considers and builds in redundancies, canal system failures are considered extremely serious. In addition to Agency managed canals, canals from other operators such as PG&E and Nevada Irrigation District have delivery points into our water systems and are considered critical within the water supply chain.

### Past Occurrences

Past occurrences include the Pulp Mill Canal in the winter of 2017 where a three-hundred and fifty foot section of a lined canal was damaged by erosion creating voids underneath the canal, causing leaks, instability of the canal, and ultimately a landslide failure undermining the canal and creating the entire section of the canal to slide down the hillside.

*Figure R-11 Pulp Mill Canal 2017*



Source: PCWA

In 2017, the Boardman canal had a slide in an unlined section of the canal that occurred above the canal. The slide blocked the flow of the canal as earthen debris from the slide ended up in the water way. Such a slide during major storms compounds water management with storm runoff only being controlled by spillways above the slide. This situation could compound additional failures and a loss of water supply.



*Figure R-12 Boardman Canal*



Source: PCWA

During the same winter a section of the Middle Fiddler Green canal had a two-hundred foot section of the lined canal start to erode away from the gunite lined edge of the canal. Any earth movement, sliding or erosion can create cracking and storm water infiltration into the supporting hillside.

This type of slide can be particularly concerning to homeowners in the area around the canal systems. Both failure and water from spill management can impact life safety, structures and infrastructure in the area.

While dam, reservoir and levee failures have not occurred recently from slide damage, this does not mean that slides from above the bodies of water, and into water storage facilities could not occur. The Agency inspects and manages dams reservoirs and levees to known best practices and follow State Dam Safety requirements.

### **Assets at Risk**

Much of the topography where Agency assets are located are on, above or below hillsides. Additionally the majority of operational hazards are at or along rivers or canal systems. All Agency assets with the exception of business offices would at some degree of risk from slides.

### ***Pandemic***

**Likelihood of Future Occurrence**–Likely  
**Vulnerability**–Medium

### **Hazard Profile and Problem Description**

According to the World Health Organization (WHO), a disease epidemic occurs when there are more cases of that disease than normal. A pandemic is a worldwide epidemic of a disease. A pandemic may occur when a new virus appears against which the human population has no immunity.

A pandemic occurs when a new virus emerges for which people have little or no immunity, and for which there is no vaccine. This disease spreads easily person-to-person, causing serious illness, and can sweep across the country and around the world in a very short time. The U.S. Centers for Disease Control (CDC) and Prevention has been working closely with other countries and the WHO to strengthen systems to detect outbreaks of that might cause a pandemic and to assist with pandemic planning and preparation. An especially severe pandemic could lead to high levels of illness, death, social disruption, and economic loss.

### **Location and Extent**

During a pandemic, the whole of the Agency, County, and surrounding region is at risk, as pandemic is a regional, national, and international event. The speed of onset of pandemic is usually short, while the duration is variable, but can last for more than a year as shown in the 1918/1919 Spanish Flu that by some estimates infected one-third of the population. There is no scientific scale to measure the magnitude of pandemic. Pandemics are usually measured in numbers affected by the pandemic, and by number who die from complications from the pandemic.

### **Past Occurrences**

There has been one state and federal disaster declaration due to pandemic, as shown in Table R-8.



*Table R-8 Placer County – State and Federal Pandemic Disaster Declarations 1950-2020*

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Pandemic	1	2020	1	2020

Source: Cal OES, FEMA

The 20th century saw three outbreaks of pandemic.

- The 1918-1919 Influenza Pandemic (H1N1)
- The February 1957-1958 Influenza Pandemic (H2N2)
- The 1968 Influenza Pandemic (H3N2)

To date, the 21st century has seen two acknowledged pandemics.

- 2009 Swine Flu (H1N1)
- 2019/2020 COVID 19

Placer County Water Agency responded to the pandemic by following National, State and Local requirements for notifications, social distancing, cleaning, mask wearing and employee management including disease testing, leave policies, quarantine, and adapting workplace configurations up to and including the closure of certain non-essential facilities. The Agency leveraged technology setting many employees up to be able to work from home and setting up software for virtual meeting and collaboration space. While Agency employees were not considered amongst the food and agricultural section of critical employees for receiving vaccinations, the Agency understood that water is a critical resource that sustains life and the Agency is prepared to continue operations under pandemic circumstances.

### **Vulnerability to and Impacts from Pandemic**

Pandemics have and will continue to have impacts on human health in the region. A pandemic occurs when a new virus emerges for which there is little or no immunity in the human population; the virus causes serious illness and spreads easily from person-to-person worldwide. There are several strategies that public health officials can use to combat a pandemic. Constant surveillance regarding the current pandemic, use of infection control techniques, and administration of vaccines once they become available. Citizens can help prevent the spread of a pandemic by staying home, or “self-quarantining,” if they suspect they are infected. Pandemic has not affected the buildings, critical facilities, or infrastructure in the Agency. Pandemic can have varying levels of impact to employees, and the Agency customer base depending on the nature of the pandemic.

Impacts could range from school and business closings to the interruption of basic services such as public transportation, health care, and the delivery of food and essential medicines. Hospitalizations and deaths can occur, especially to the elderly or those with pre-existing underlying conditions. As seen with Covid-19, multiple businesses were forced to close temporarily (some permanently), and unemployment rose significantly. Supply chains for food and essentials can be interrupted.

## Assets at Risk

Pandemics do not typically destroy physical facilities, but can affect Agency personnel who operate Agency facilities. Additional deep cleaning and regular sanitization procedures were introduced following standard industrial hygiene practices. The operation of physical assets could be impacted as there is a level of knowledge for the operation of treated water, raw water, and water treatment plants as well as operation and maintenance of hydro-electric facilities. Inspections, maintenance, and capital investment may have been arrested to varying degrees and unknown impact on physical facilities. A loss of institutional knowledge can occur from death or retirements.

## *Severe Weather: Heavy Rains and Storms*

**Likelihood of Future Occurrence**—Highly Likely

**Vulnerability**—Medium

## Hazard Profile and Problem Description

Storms in the Agency occur annually and are generally characterized by heavy rain often accompanied by strong winds and sometimes lightning and hail. Approximately 10 percent of the thunderstorms that occur each year in the United States are classified as severe. A thunderstorm is classified as severe when it contains one or more of the following phenomena: hail that is three-quarters of an inch or greater, winds in excess of 50 knots (57.5 mph), or a tornado. Heavy precipitation in the Agency falls mainly in the fall, winter, and spring months in the western side of the County and primarily in the fall and spring in the eastern side of the County.

## Location and Extent

Heavy rain events occur on a regional basis. Rains and storms can occur in any location of the Agency. All portions of the Agency are at risk to heavy rains. Most of the severe rains occur during the fall, winter, and spring months. There is no scale by which heavy rains and severe storms are measured. Magnitude of storms is measured often in rainfall and damages. The speed of onset of heavy rains can be short, but accurate weather prediction mechanisms often let the public know of upcoming events. Duration of severe storms in California, Placer County, and the Agency can range from minutes to hours to days. Information on precipitation extremes can be found in Section 4.3.4 of the Base Plan.

## Past Occurrences

There have been past disaster declarations from heavy rains and storms, which were discussed in Past Occurrences of the flood section above. According to historical hazard data, severe weather, including heavy rains and storms, can be an annual occurrence in the Agency. This is the cause of many of the federal disaster declarations related to flooding.

Big Storms years with atmospheric rivers occurred in 1982, 1983, 1995, 1997, and 2017. Storms in January and February of 2017 caused damage to multiple Agency facilities with the Flooding and Landslide Hazards listed above. In addition, damage to private property occurs from canal and water way overflows. This is

not accurately captured as it is considered “weather,” and an “Act of God” type of loss that falls on private insurance carriers when coverage is purchased by the citizenry.

## **Vulnerability to and Impacts from Heavy Rain and Storms**

Heavy rain and severe storms are the most frequent type of severe weather occurrences in the Agency. These events can cause localized flooding. Elongated events, or events that occur during times where the ground is already saturated can cause 1% and 0.2% annual chance flooding. Wind often accompanies these storms and has caused damage in the past. Hail and lightning are rare in the Agency.

Actual damage associated with the effects of severe weather include impacts to property, critical facilities (such as utilities), and life safety. Heavy rains and storms often result in localized flooding creating significant issues. Roads can become impassable and ground saturation can result in instability, collapse, or other damage to trees, structures, roadways and other critical infrastructure. Floodwaters and downed trees can break utilities and interrupt services.

During periods of heavy rains and storms, power outages can occur. These power outages can affect pumping stations and lift stations that help alleviate flooding. More information on power shortage and failure can be found in the Severe Weather: Extreme Heat Section above, as well as in Section 4.3.2 of the Base Plan.

### **Assets at Risk**

Water conveyance, pumpstations and water treatment plants can be the hardest hit by winter storms.

### ***Tree Mortality***

**Likelihood of Future Occurrence**–Likely

**Vulnerability**–Medium

## **Hazard Profile and Problem Description**

One of the many vulnerabilities of drought in Placer County is the increased risk of widespread tree mortality events that pose hazards to people, homes, and community infrastructure, create a regional economic burden to mitigate, and contribute to future fuel loads in forests surrounding communities. During extended drought, tree mortality is driven by a build-up in endemic bark beetle populations and exacerbated by latent populations of a suite of native insects and disease. Non-native forest pests (insects and/or pathogens) can also contribute to tree mortality events.

### **Location and Extent**

Onset of tree mortality events can be relatively fast; however, conditions – such as high stand densities – that lead to tree mortality accumulate slowly over time. Duration of tree mortality is lengthy, as once the tree dies, it remains in place until removed by human activity, wildfire, or breakdown of the wood by nature. Many areas in Placer County have seen increases in tree mortality. The County has mapped these areas,

and that map was shown in Section 4.3.18 of the Base Plan. Using a color legend, the map provided by CAL FIRE shows a scale of:

- Deep burgundy depicting areas with more than 40 dead trees per acre
- Red depicting 15 - 40 dead trees per acre
- Orange depicting 5 -15 dead trees per acre
  - Yellow depicting 5 or less dead trees per acre

In the past decade, mortality has increased in the eastern portion of Placer County. During the 2012-2018 drought, the state of California Tree Mortality Task force designated multiple Tier 1 and Tier 2 High Hazard Zones where tree mortality posed an elevated risk to human health, properties, and resource values. A number of Placer County areas were designated during this event and the majority of Placer County watersheds were designated as Tier 2 high hazard zones because of the significant levels of tree mortality, along with numerous Tier 1 High hazard “hot spots”. A map of these areas was shown in in Section 4.3.18 of the Base Plan.

### **Past Occurrences**

There have been no state or federal disasters in the County related directly to tree mortality, though it has most likely contributed to the intensity of past wildfires in the County. Those events are shown in the Past Occurrences section of Wildfire below. In 2015, then-Governor Edmund G. Brown Jr. proclaimed a state of emergency due to the extreme hazard of the dead and dying trees. Following the proclamation, 10 counties were determined to be most affected, which included Placer County. Placer County proclaimed a local emergency due to tree mortality conditions on Dec. 8, 2015. No events of past tree mortality have affected the Agency. Tree mortality most often presents losses through damaged or falling trees during high winds or more significantly through wildfire size and intensity of Wildfire. See the Wildfire Hazard summary.

### **Vulnerability to and Impacts from Tree Mortality**

Placer County is unique in that many residential and business areas of the community are in the wildland urban interface with the forest. Trees in these interface areas are particularly vulnerable to insect and/or drought driven mortality because of the additional stressors that urban environments impose on trees (i.e. soil compaction, altered hydrology, physical damage, heat islands etc.). This exacerbates the occurrence of tree mortality within the populated settings of the County.

Dead trees are a hazard to the general public and forest visitors, but the risk of injury, death, property damage or infrastructure damages varies depending how the hazard interacts with potential targets. Dead trees within the wildland urban intermix or wildland urban interface or urban areas therefore pose a greater risk to due to their proximity to residents, businesses, and road, power, and communication infrastructure.

Dead trees may fall or deteriorate in their entirety or in part – either mechanism has the potential for injury, death, or inflicting severe damage to targets. As the time since tree mortality increases, so does the deterioration of wood and the potential for tree failure.

Tree mortality impacts the Agency in various ways. Wildfire intensity and size cannot be ignored. The Agency has almost two hundred properties in its property portfolio and additional easements and assets along 786 miles of delivery system. Not only do we have assets exposed, but the water supply system itself, is critical for fighting fire. The Agency maintains a strong presence with adjacent landowners, naturalist groups, forest services and the firefighting community.

In Power Systems, the dead trees and debris makes its way from the watershed into the rivers creating debris and large log hazards for dams and increased silt and sedimentation of the water ways. Large storms exacerbate tree mortality periods by increasing the hazards for dams and complicating water management.

Dead trees shed, fail, or die in place threatening the canal system or other assets with water blockages or canal failures. The dead trees can become an issue of contention between landowners and the Agency complicating easements and good will.

### **Assets at Risk**

All Agency physical assets are at risk and as learned from the Camp Fire even underground water delivery systems can be damaged by the extreme heat of a wildfire. Most likely assets to sustain damages are dams, buildings, flumes and canal systems impacted by tree failure, debris or wildfire.

### ***Wildfire***

**Likelihood of Future Occurrence**—Highly Likely

**Vulnerability**—High

### **Hazard Profile and Problem Description**

Wildland fire and the risk of a conflagration is an ongoing concern for the PCWA. Throughout California, communities are increasingly concerned about wildfire safety as increased development in the foothills and mountain areas and subsequent fire control practices have affected the natural cycle of the ecosystem. Wildland fires affect grass, forest, and brushlands, as well as any structures located within them. Where there is human access to wildland areas the risk of fire increases due to a greater chance for human carelessness and historical fire management practices. In the past, the fire season extended from early spring through late fall of each year during the hotter, dryer months; however, in recent years, the risk of wildfire has become a year around concern. Fire conditions arise from a combination of high temperatures, low moisture content in the air and fuel, accumulation of vegetation, and high winds. While wildfire risk has predominantly been associated with more remote forested areas and wildland urban interface (WUI) areas, significant wildfires can also occur in more populated, urban areas. A large part of the Agency service area is in the WUI.

### **Extreme Heat/Wildfire and Power Shortage/Power Failure**

The US power grid crisscrosses the country, bringing electricity to homes, offices, factories, warehouses, farms, traffic lights and even campgrounds. According to statistics gathered by the Department of Energy, major blackouts are on the upswing. Incredibly, over the past two decades, blackouts impacting at least 50,000 customers have increased 124 percent. The electric power industry does not have a universal

agreement for classifying disruptions. Nevertheless, it is important to recognize that different types of outages are possible so that plans may be made to handle them effectively. In addition to blackouts, brownouts can occur. A brownout is an intentional or unintentional drop in voltage in an electrical power supply system. Intentional brownouts are used for load reduction in an emergency. Electric power disruptions can be generally grouped into two categories: intentional and unintentional. More information on types of power disruptions can be found in Section 4.3.2 of the Base Plan.

Accidents to power distribution lines can occur from weather conditions or at random. One such random event of power failure struck the Agency on October 22, 2020. A vehicle struck a power line near Newcastle. The Agency was able to avoid major issues but noted that damages could have been extensive if the water treatment and distribution system ran dry. Without electricity the Agency cannot treat water. Fire services and potable water could have been adversely impacted.

### *Public Safety Power Shutoff (PSPS)*

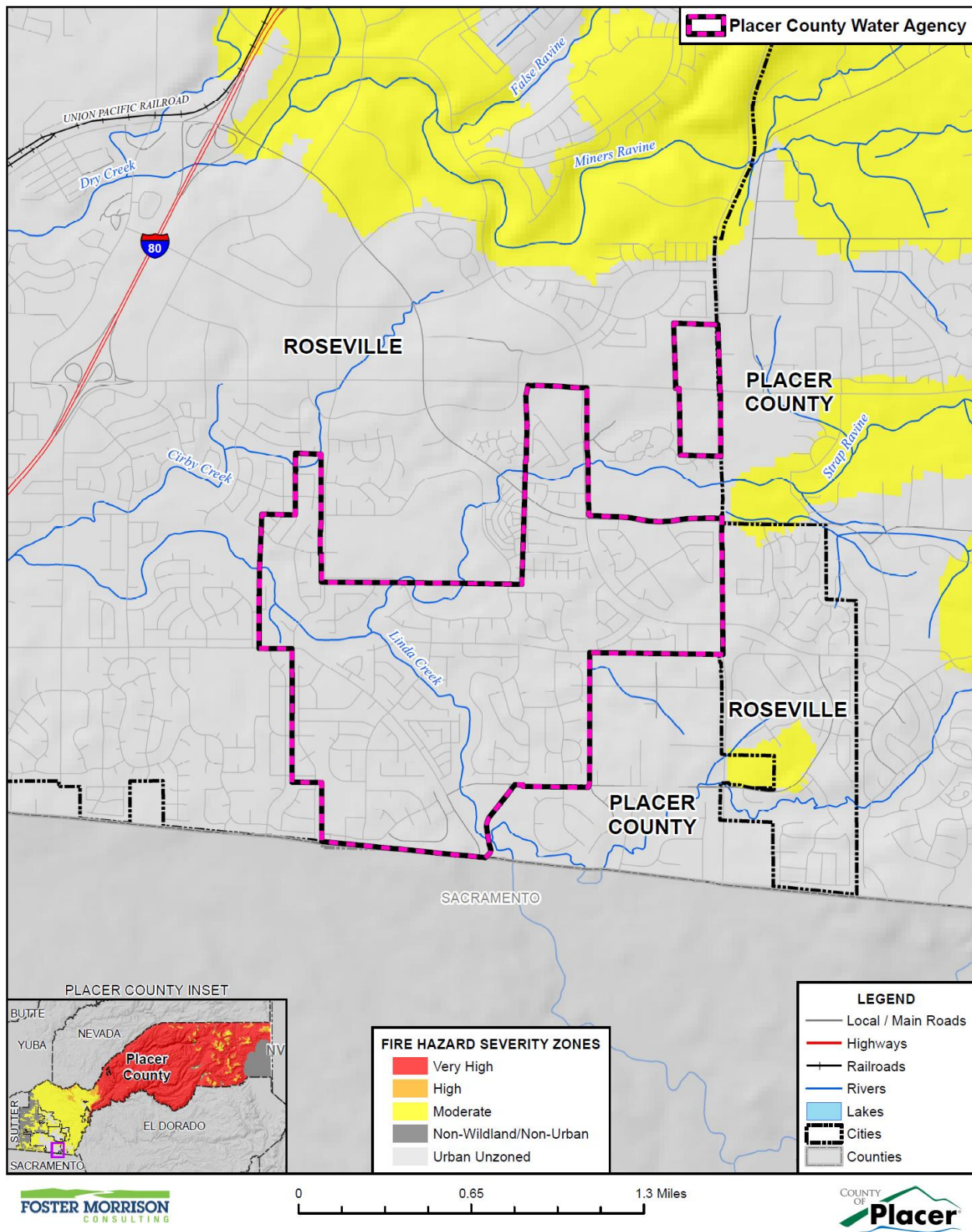
A new intentional disruption type of power shortage/failure event has recently occurred in California. In recent years, several wildfires have started as a result of downed power lines or electrical equipment. This was the case for the Camp Fire in 2018. As a result, California's three largest energy companies (including PG&E), at the direction of the California Public Utilities Commission (CPUC), are coordinating to prepare all Californians for the threat of wildfires and power outages during times of extreme weather. To help protect customers and communities during extreme weather events, electric power may be shut off for public safety in an effort to prevent a wildfire. This is called a Public Safety Power Shutoffs (PSPS.) More information on PSPS criteria can be found in Section 4.3.2 of the Base Plan. PSPS events are becoming common in the fall during high wind events. The Agency noted it have been affected by PSPS on September 8<sup>th</sup> and 9<sup>th</sup> of 2020; September 26<sup>th</sup> through September 28, 2020; October 25, 2020; and October 28, 2020. While the Agency has many backup systems, unintended consequences can occur when migrating to the backup system. Furthermore the general public has turned to small generators which create additional fire danger and pollution.

### **Location and Extent**

Wildfire can affect all areas of the Agency. CAL FIRE has estimated that the risk varies across the Agency and has created maps showing risk variance. Following the methodology described in Section 4.3.19 of the Base Plan, wildfire maps for the PCWA were created. Figure R-13 shows the CAL FIRE FHSZ in the Agency. As shown on the maps, fire hazard severity zones within the Agency range from Non-Wildland/Non-Urban to very high hazardous wilderness areas on the Eastern side of the map.



Figure R-13 PCWA – Fire Hazard Severity Zones



Data Source: Cal-Fire (Draft 09/2007 - c31fhszl06\_1, Adopted 11/2007 - fhszs06\_3\_31, Recommended 12/2008 - c31fhszl06\_3), Placer County GIS, Cal-Atlas, NVBLM; Map Date: 2021.

Wildfires tend to be measured in structure damages, injuries, and loss of life as well as on acres burned. Fires can have a quick speed of onset, especially during periods of high wind, drought or during or after hot dry summer months. Fires can burn for a short period of time or may have uncontrolled durations lasting for weeks or longer. Smoldering materials can last for months.

### Past Occurrences

There has been five state and six federal disaster declarations for Placer County from fire. These can be seen in Table R-9.

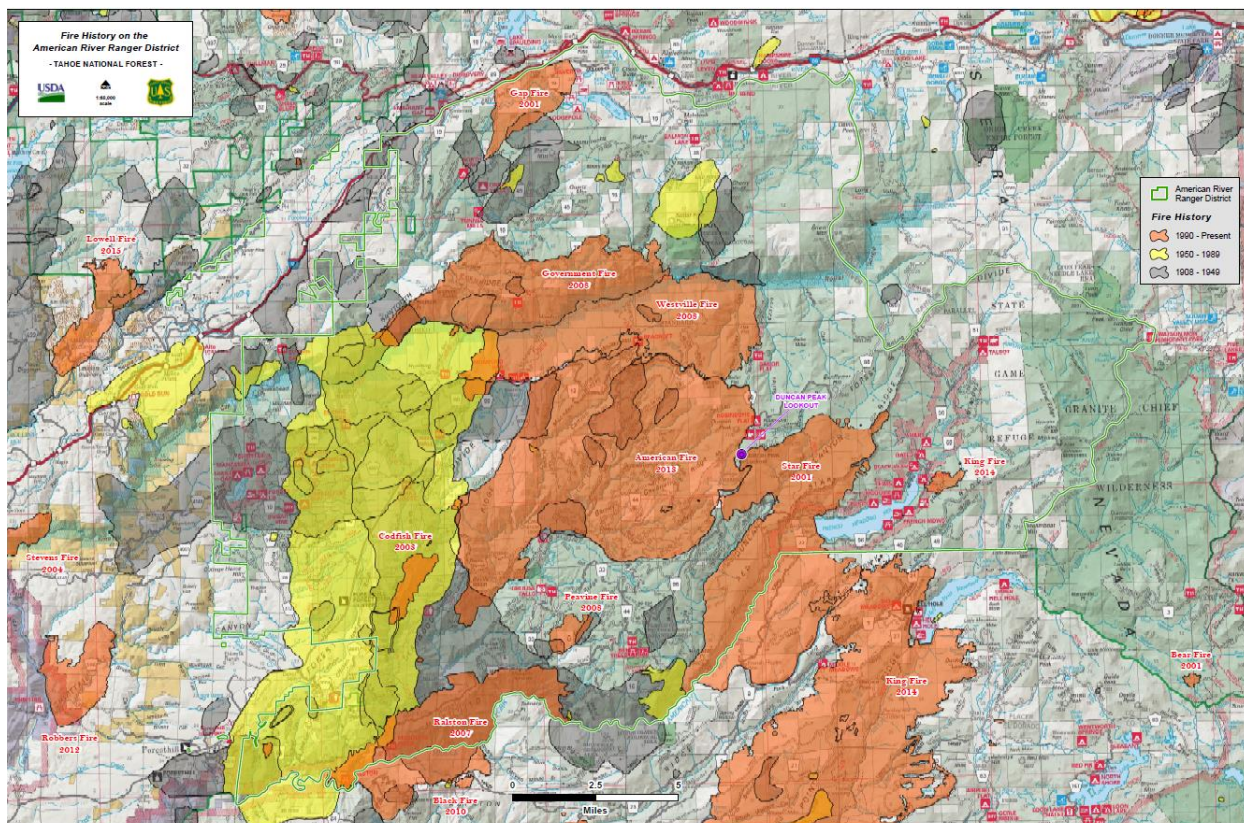
*Table R-9 Placer County – State and Federal Disaster Declarations Summary 1950-2020*

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Fire	5	1961, 1965, 1973, 1987, 2010	6	2002, 2004, 2008, 2009, 2014 (twice)

Source: Cal OES, FEMA

The Agency provided a map of fires that have occurred in and around PCWA territory. This is shown on Figure R-14.

*Figure R-14 PCWA – Area Fires*



Source: US Forest Service



The Agency also noted it was affected by a fire on September 8, 2020. A fire occurred in the El Dorado National Forest. Evacuations occurred in the area. Distribution power lines were shutdown which led to an electrical generation shut down. Damage values have not been fully calculated. The Agency noted that in the long term, wildfire debris, erosion and waterway damage typically plague the Agency years into the future.

### Vulnerability to and Impacts from Wildfire

Risk and vulnerability to the Placer County Planning Area and the Agency from wildfire is of significant concern, with some of the Planning Area being at greater risk than others as described further in this section. High fuel loads in the Planning Area, combined with developed land and increasing population, create the potential for both natural and human-caused fires that can result in loss of life and property. These factors, combined with natural weather conditions common to the area, including periods of drought, high temperatures, low relative humidity, and periodic winds, can result in frequent and potentially catastrophic fires. During the nearly year around fire season, the dry vegetation and hot and sometimes windy weather results in an increase in the number of ignitions. Any fire, once ignited, has the potential to quickly become a large, out-of-control fire. As adverse climate changes and development continues throughout the County, especially in these interface areas, the risk and vulnerability to wildfires will likely increase.

Potential impacts from wildfire include loss of life and injuries, damage to structures and other improvements, the loss of natural and cultural resources, croplands, and loss of recreational opportunities. Wildfires can cause short-term and long-term disruption to the Agency. Fires can have devastating effects on watersheds through loss of vegetation and soil erosion, which may impact the Agency by changing runoff patterns, increasing sedimentation, reducing natural and reservoir water storage capacity, and degrading water quality. Fires can also affect air quality smoke and air pollution from wildfires can be a severe health hazard impacting the citizenry and employees.

Although the physical damages and casualties arising from large fires may be severe, it is important to recognize that they also cause significant economic impacts by resulting in a loss of function of buildings and infrastructure. Economic impacts of loss of transportation and utility services may include traffic delays/detours from road and bridge closures and loss of electric power, potable water, and wastewater services. Schools and businesses can be forced to close for extended periods of time. Recently, the threat of wildfire, combined with the potential for high winds, heat, and low humidity, has caused PG&E to initiate PSPSs which can also significantly impact a community through loss of services, business closures, and other impacts associated with loss of power for an extended period. More information on power shortage and failure can be found in the Severe Weather: Extreme Heat Section above, as well as in Section 4.3.2 of the Base Plan. In addition, catastrophic wildfire can create favorable conditions for other hazards such as flooding, landslides, and erosion during the rainy season.

The top of the water shed (water supply system) is located in an area prone to wildfire. Assets include canals, flumes, treatment plants and water storage facilities. While flumes are typically “big timber” (see Figure R-15) they range in age and condition and could limit the flow of water through the water supply system. Emergency Services should give special consideration to water facilities because of the symbiotic working relationship. It is recommended that Emergency Services immediately work with the Agency during emergency situations.

*Figure R-15 Traditional Big Timber Flume*



Source: PCWA

The Power Project is in a wilderness area that is prone to wildfire. Facilities have been intelligently planned and have survived multiple fires but are still susceptible to damages that can be caused by wildfire. Primary weaknesses include access, communications, and power lines. Dorms, housing, campgrounds and recreational facilities are also more likely to combust. Water resources are used to assist with firefighting where applicable. Wildfire is a great risk for both water and power production.

#### **Assets at Risk**

The majority of Agency assets are in rural or wildland-urban interfaces (WUI,) areas which have historically taken the brunt of wildfires. The Agency would consider all assets at high risk of wildfire.

## **R.6 Capability Assessment**

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capabilities assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation education, outreach, and partnerships, and other mitigation efforts.

## R.6.1. Regulatory Mitigation Capabilities

Table R-10 lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the PCWA.

*Table R-10 PCWA Regulatory Mitigation Capabilities*

Plans	Y/N Year	Does the plan/program address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
Comprehensive/Master Plan/General Plan	Y 2021	Strategic plan approved by the Board considers sustainability and reliability of the Agency and system. Yes
Capital Improvements Plan	Y Annual	Capital Improvements are included in the Budget process and include risk and replacement annually. Yes
Economic Development Plan	N	See Placer County.
Local Emergency Operations Plan	N	See Placer County.
Continuity of Operations Plan	Y 2020	AWIA/FERC Emergency Action Plans.
Transportation Plan	N	See Placer County.
Stormwater Management Plan/Program	N	See Placer County.
Engineering Studies for Streams	N	See Placer County.
Community Wildfire Protection Plan	N	See Placer County.
Agency Rules and Regulations	Y	Rules, regulations, rates and charges governing the distribution and use of water.
<b>Building Code, Permitting, and Inspections</b>	<b>Y/N</b>	<b>Are codes adequately enforced?</b>
Building Code	N	Version/Year: See Placer County
Building Code Effectiveness Grading Schedule (BCEGS) Score	N	Score: See Placer County
Fire department ISO rating:	N	Rating: Varies by property location.
Site plan review requirements	Y	Technical Services/Engineering for “water availability.”
Agency Rules and Regulations	Y	Rules, regulations, rates and charges governing the distribution and use of water.
<b>Land Use Planning and Ordinances</b>	<b>Y/N</b>	<b>Is the ordinance an effective measure for reducing hazard impacts? Is the ordinance adequately administered and enforced?</b>
Zoning ordinance	N	See Placer County
Subdivision ordinance	N	See Placer County
Floodplain ordinance	N	See Placer County
Natural hazard specific ordinance (stormwater, steep slope, wildfire)	N	See Placer County
Flood insurance rate maps	N	See Placer County
Elevation Certificates	N	See Placer County



Acquisition of land for open space and public recreation uses	Y	The Agency maintains recreation land as a part of the FERC Licensing Agreement.
Erosion or sediment control program	Y	Dam and asset inspection and monitoring.
<b>How can these capabilities be expanded and improved to reduce risk?</b>		
Regular risk assessment, planning and implementation of risk reduction measures are incorporated into various aspects of operations. The Agency has multiple cooperative partnerships to leverage these activities. Perhaps additional grant funding could accelerate risk reduction, but there is limited staff availability for grant writing.		

Source: PCWA

As indicated above, the Agency, in conjunction with Placer County, has several programs, plans, policies, and codes and ordinances that guide hazard mitigation. Some of these Agency-specific elements are described in more detail below.

### *Placer County Urban Water Management Plan, 2015*

PCWA has prepared the Urban Water Management Plan (UWMP) to comply with the Urban Water Management Planning Act (UWMPA) requirements for urban water suppliers. This UWMP addresses PCWA's water management planning efforts to ensure adequate water supply to meet demands over the next 30 years. The 2015 UWMP specifically assesses the availability of supplies to meet future demands during normal, single-dry and multiple dry years. The plan takes in consideration catastrophic interruption and drought. This plan can be found on the Agency website at: [Environmental Planning & Compliance | pcwa.net](http://Environmental Planning & Compliance | pcwa.net)

### *Placer County Water Connection Charge Plan (and Development Process)*

The Water Connection Charge Plan facilitates development and standard specifications for residential and commercial water system design in the PCWA service area. Connection charges and water sales are administered per the plan. It can be located on the PCWA website: [New Development Process | pcwa.net](http://New Development Process | pcwa.net)

## **R.6.2. Administrative/Technical Mitigation Capabilities**

The Agency is governed by a five-member Board of Directors, elected to four-year terms by voters residing within five geographical areas of Placer County. The Board of Directors meets twice monthly in regular session and holds special meetings as needed.

The Board employs a General Manager to administer all Agency activities, services and employment, and in-house counsel to advise the Agency on legal and regulatory matters and retained counsel specific to advising the Board of Directors. The Agency staffs 230 full-time employees in total. About 74-employees work out of the Auburn Business Center. Departments include Administrative Services, Resource Development, Technical Services, Customer Services, and Financial Services. The Agency participates in the Placer County Local Hazard Mitigation Plan, the Placer County Emergency Operations Plan, and has a room set up to activate as an Agency Emergency Operation Center with radio, telecommunications, satellite phone service and A/V capabilities.

The Power Systems Office is located in Foresthill where operations are conducted for the Middle Fork Project. 35-employees manage the engineering, maintenance and operations of the hydro-electric system



which includes 4 dams, 3 diversions, 5 powerhouses and associated tunnels, penstocks and facilities. There are up-to-date Emergency Management Plans, FERC Emergency Action Plans, and a FERC Security Plan for the operations.

Drinking Water Operations are coordinated from offices located on Ferguson Road, across from the Business Center but utilize various treatment plants and water storage facilities. Drinking Water Operations consists of 38-employees who are directly involved in the production and distribution of treated drinking water. A team of water plant operators coordinate operation of eight water treatment plants. Water quality personnel interpret public health laws, monitor water to ensure its safety, perform necessary reporting to the USEPA and California Department of Health Services. Water treatment plant maintenance personnel maintain and repair all the water quality facilities including the treatment plants, pump sites and well sites. Water distribution operators route water through pipeline systems and manage a network of tanks, pumps and pressure-control stations. Drinking Water Operations maintains the Hazardous Materials Business Plan. The Risk Assessment and Emergency Response Plans meeting the America's Water Infrastructure Act were completed in 2020.

Field Service has 68-employees who maintain 165-miles of canal and 616-miles of drinking water delivery systems. The Field corporate yard is located on Maidu Ave close to the edge of the American River Canyon. This yard houses the materials and heavy equipment required to maintain the raw and drinking water delivery systems.

Customer Services has a staff of 19-employees who provide a range of services including assisting the customer with all service related issues, service installations, new accounts, billing, payment processing, collections and water use efficiency. The department coordinates customer notifications during schedule maintenance projects and when water system emergencies arise (outages). Customer Services maintains an Agency Emergency Response Plan and an Interactive Voice Response (IVR) system for emergency notifications to the customer base.

The meter services crew conducts the agency's meter reading, testing and replacement programs. Other activities include a cross-control program that prevents the reverse flow of water from private services back into the public water system and the constructed conveyance program that assists canal water customers in obtaining alternate water supplies for in-home use.

Table R-11 identifies the Agency department(s) responsible for activities related to mitigation and loss prevention in PCWA.

*Table R-11 PCWA's Administrative and Technical Mitigation Capabilities*

Administration	Y/N	Describe capability Is coordination effective?
County Wide Master Plan – Financial Assistance Program	Y	Loans or grants provided to districts for conservation and development of eligible water supplies and Facilities. Yes.
Placer County Urban Water Management Plan	Y	Addresses water demand and water supply
Water Connection Charge Plan	Y	Connection charges and development requirements.
Planning Commission	N	See Placer County

Mitigation Planning Committee	N	See Placer County
Maintenance programs to reduce risk (e.g., tree trimming, clearing drainage systems)	Y	See Cal-Fire, Operations, Maintenance and cooperative agreements.
Mutual aid agreements	Y	The Agency has mutual aid agreements with other water/power entities for employees and equipment in the event of a disaster.
Staff	Y/N FT/PT	Is staffing adequate to enforce regulations? Is staff trained on hazards and mitigation? Is coordination between agencies and staff effective?
Chief Building Official	N	See Placer County
Emergency Manager	N	See Placer County
Community Planner	N	See Placer County
Civil Engineer	N	See Placer County
GIS Coordinator	N	See Placer County Coordinated with the Agency GIS Staff
Other		
<b>Technical</b>		
Warning systems/services (Reverse 911, outdoor warning signals)	N	See Placer County
Hazard data and information	N	See Placer County
Grant writing	N	See Placer County
Hazard analysis	N	See Placer County
Agency Customer IVR Reverse Notification System	Y	Agency system, effective for customer base notifications, adequately trained and staffed.
<b>How can these capabilities be expanded and improved to reduce risk?</b>		
The Agency has a close working relationship with the County for governance planning and emergency services.		

Source: PCWA

### R.6.3. Fiscal Mitigation Capabilities

Table R-12 identifies financial tools or resources that the Agency could potentially use to help fund mitigation activities.

*Table R-12 PCWA's Fiscal Mitigation Capabilities*

Funding Resource	Access/ Eligibility (Y/N)	Has the funding resource been used in past and for what type of activities? Could the resource be used to fund future mitigation actions?
Capital improvements project funding	N	Extensively used in projects described.
Authority to levy taxes for specific purposes	N	
Fees for water, sewer, gas, or electric services	Y	Used in Placer County for conservation.
Impact fees for new development	N	
Storm water utility fee	Y	Check?

Funding Resource	Access/ Eligibility (Y/N)	Has the funding resource been used in past and for what type of activities? Could the resource be used to fund future mitigation actions?
Incur debt through general obligation bonds and/or special tax bonds	N	
Incur debt through private activities	N	
Community Development Block Grant	N	
Other federal funding programs	N	
State and Federal Hazard Mitigation Grants	Y	Used for Prevention, hardening or replacing infrastructure.
Facility Agreements	Y	Used for accepting compliant water infrastructure from development.
Insurance	Y	Used for replacement and stabilization of existing hazard conditions after loss.
<b>How can these capabilities be expanded and improved to reduce risk?</b>		
Many grant projects require expensive pre-planning for qualification. In some cases, this pre-work prevents acceptable grant applications. Grant applications and work require additional staffing in a very lean organization.		

Source: PCWA

## R.6.4. Mitigation Education, Outreach, and Partnerships

Table R-13 identifies education and outreach programs and methods already in place that could be/or are used to implement mitigation activities and communicate hazard-related information.

*Table R-13 PCWA's Mitigation Education, Outreach, and Partnerships*

Program/Organization	Yes/No	Describe program/organization and how relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities?
Sierra-French Meadows Forest Restoration Partnership	Y	See items below this table.
Mountain Counties Water Resource Association	Y	See items below this table.
Urban Water Management Plan	Y	See items below this table.
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	Y	See items below this table.
Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Y	See items below this table.
Natural disaster or safety related school programs	N	
StormReady certification	N	
Firewise Communities certification	N	
Public-private partnership initiatives addressing disaster- related issues	Y	See items below this table.

Program/Organization	Yes/No	Describe program/organization and how relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities?
Other	Y	See items below this table.
How can these capabilities be expanded and improved to reduce risk?		
The Agency maintains many active partnerships and participates in a variety of strategic planning and outreach and will continue to do so. Some of this outreach is outlined below. Other things such as the joint Fire and Water annual community service publication focused on wildfire preparedness and water and forest conservation.		

Source: PCWA

PCWA has several partners in carrying out Agency objectives. These include:

**Sierra-French Meadows Forest Restoration Partnership** - The Sierra-French Meadows Forest Restoration Partnership Includes PCWA, Placer County, The U.S. Forest Service, the Nature Conservancy, The Sierra Nevada Conservancy, The American River Conservancy and UC Merced SNRI all working together to make the forest healthy and more resilient. Located in the headwaters of the Middle Fork American River, in the Tahoe National Forest, the Project aims to restore forest health by reducing high-severity fires across 28,000 acres of critical watershed, and to study the effects of forest treatments on ecosystem health. [FrenchMeadowsLessons\\_2019.pdf \(scienceforconservation.org\)](#)

**Mountain Counties Water Resource Association** – The Mountain Counties Water Resource Association seeks to educate state, local and federal decision-makers on the issues facing water agencies in the region. These issues include long-term sustainability through many of the hazards within this plan. [Mountain Counties Water Resources Association](#)

**Urban Water Management Plan** – The Urban Water Management Plan (UWMP) unifies planning for California watersheds into watershed area plans, considering the entire watershed and the more geographically far-reaching impacts of water.

**River Arc** – River Arc seeks to improve water reliability in the Sacramento region using surplus water from the American River and sustaining ground water reserves to refill groundwater basins during wet years in collaboration with area water providers. [www.riverarcproject.com](http://www.riverarcproject.com)

**Regional Water Authority** – The Regional Water Authority is comprised of both public and private partners seeking to address the impact of climate change on water supplies and kickstarting the Sacramento Regional Water Bank for sustainable water storage and recovery. [RWA \(rwah2o.org\)](http://RWA (rwah2o.org))

**Water Education Foundation** – The Water Education Foundation is an impartial non-profit organization which develops and implements education programs leading to a broader understanding of water issues and to the resolution of water problems. The Agency supports the Foundation and its mission.

**County of Placer** – PCWA is a supporter of the Placer Legacy program. The Agency has been asked by the US Fish & Wildlife Service to participate in the development of an HCP/NCCP “Natural Communities Conservation Plan” in part to mitigate for the potential secondary impacts of the growth that could be enabled by the continued development of the Agency’s existing water rights.

**Sacramento River Watershed Program** – The SRWP represents a wide coalition of stakeholders who care about the quality of the water and quality of life in the Sacramento River Watershed. Areas of emphasis include monitoring toxic pollutants, public outreach and education, and biological and habitat preservation. The Agency is studying the feasibility of a Sacramento River diversion in exchange for an equal release of its water right water in the American River. The Agency’s proposed Sacramento River diversion project would be consistent with the SRWP goals and objectives. [Sacramento River Watershed Program \(sacriver.org\)](http://sacriver.org)

**The United States Forest Service** – Is a Federal Agency under the US Department of Agriculture responsible for administering National Forests and Grass Lands which include the Tahoe and El Dorado Forest. PCWA enjoys a strong relationship working alongside the Forest Service as our facilities and watersheds are intermingled.

**The United States Bureau of Reclamation** – Is a Federal Agency under the US Department of the Interior which oversees water resource management specifically as it applies to the oversight and operation of diversion, delivery and storage and hydroelectric projects. The USBR still has an interest in the American River at the former site of the Auburn Dam.

**The State Department of Parks & Recreation** – Auburn State Recreation Area – The Auburn State Recreation Area is a part of the California Department of Parks and Recreation. They are responsible for the conservation and management of approximately 20-miles of park along the confluence of the American River.

**Federal Energy Regulatory Commission (FERC)** – Is an independent government agency that regulates the generation and transmission of energy, and more specifically licenses the Middle Fork Hydroelectric Project.

**Pacific Gas & Electric Company (PG&E)** – PG&E is a utility company delivering energy services to Northern and Central California. PG&E has multiple land, operational and watershed connections with PCWA.

**Cal-Fire** – Is a major incident management responder, providing varied emergency services. Cal-Fire has both State and Local responsibilities and is a primary responder to wildland fire in the Placer/El Dorado Area. PCWA has a working relationship with Cal-Fire that includes water and the sharing of with other Agency resources.

**Protect American River Canyons (PARC)** – PARC is a community-based non-profit organization located in Auburn that is dedicated to building American River community through collaboration and protection of the natural, recreational and historical resources for the North and Middle Forks of the American River Watershed.

**Department of Water Resources** – DWR’s mission is to manage the water resources in California in cooperation with other agencies, to benefit the State’s people, and to protect, restore, and enhance the natural and human environment. PCWA coordinates with DWR on groundwater monitoring in west Placer County, interstate water resource negotiations regarding the Truckee River system, and on other regional issues.

**Water Forum** – The Water Forum was a collaborative process of a diverse group of business and agricultural leaders, citizens groups, environmental interests, water managers and local governments in Sacramento County, Placer County, and El Dorado County, with the co-equal objectives to (a) provide a reliable and safe water supply for the region’s economic health and planned development to the year 2030, and (b) preserve the fishery, wildlife, recreational, and aesthetic values of the Lower American River. Implementation of the Water Forum Agreement will continue under the WF Successor Effort for many years.

**Regional Water Authority** – The RWA is a joint powers authority, formed to serve and represent regional water supply interests and to assist its members in protecting and enhancing the reliability, availability and quality of water resources. PCWA is a member and supporter of RWA.

**City of Roseville** – PCWA provides water from its Middle Fork American River Project (MFP) to the City. PCWA also has several interconnections between its treated water system and the cities that enable each to help the other in emergencies.

**San Juan Water District** – PCWA provides water from its MFP to the Agency to supply its customers within Placer County. PCWA also has several interconnections between its treated water system and the San Juan’s that enable each to help the other in emergencies.

**Nevada Irrigation District** – NID and PCWA have common watershed and multiple interconnections that can be used to support water service.

### **R.6.5. Other Mitigation Efforts**

The Agency is involved in a variety of mitigation activities including public outreach and project activities. These mitigation activities include:

- Public Service Advertisements [www.pcwa.net](http://www.pcwa.net)
- Water Conservation (public outreach) program [www.pcwa.net](http://www.pcwa.net)
- Website Newsletters to the general public [www.pcwa.net](http://www.pcwa.net)

**The Agency Water Conservation Program** includes residential programs and rebates for: high efficiency clothes washing machines, high efficiency toilets, hot-water recirculation systems, point of use hot water heater, new lawn replacement pilot program, free mulch distribution, and water wise house calls. Commercial programs include customer recognition for conservation (Flume Awards) and rebates including high efficiency toilet rebate program, waterless urinal rebate program, water wise business calls & large landscape irrigation survey for information on these and other programs customers may visit the PCWA Web site and visit the Customer Service section for the Water Use Efficiency pages at [www.pcwa.net](http://www.pcwa.net).

**Field Services Canal Guniting Projects** – Lining earthen canals with gunite prevents soil bank erosion and water loss from seeping into the ground. Cracks and repairs to gunite have to be maintained as roots and earth movement cause areas of entropy. This work conserves water loss and is increasingly important during prolonged drought. Ongoing in capital planning budgets and operations. one-million per year.



Emergency gunting was done for the Middle Fiddler Green & Pulp Mill canals when 2017 Storms caused heavy losses this was paid from FEMA Claims & internal emergency funding.

**Hillside Slope Stabilization to prevent landslide** - Rockfall anchors and netting were installed at Interbay Road in January of 2018 when a slide blocked safe access to the Middle Fork Powerhouse. Insurance funded preventative actions and repair of the area so that the road could be reopened. PCWA has spent some \$4-Million in rock fall mitigation over the last 7-years.

**Hell Hole Dam Core Raise** - In 2020 PCWA raised the impervious core of the Hell Hole Dam to increase water capacity, for drought and flood control, and to strengthen the dam against catastrophic storm failure. The project was an internally funded Capital Project.

**French Meadows Forest Fire Restoration Project** - Is a community partnership founded to reduce high-severity wildfires and promote watershed restoration. The French Meadows partnership restored forest health to 1,066 acres of critical headwaters in the first year of the French Meadows Forest Restoration Project reducing stand density by over 30% and harvesting over 3 million board feet of timber. This prevented a loss of unique wet meadow habitat critical for reducing the intensity and spread of wildfire.

**Wooden Flume Replacement** – Flumes are a critical part of the canal system carrying water across valleys and ravines in a gravity fed canal system. The Agency seeks to replace wooden flume structures where practical to prevent wildfire and hazardous materials service interruptions. Long Ravine, Secret Town, Penryn #1 Fumes put into pipe through internal Capital plans and spending.

**American River Pump Station** – The American River Pump Station allows the Agency to draw water from the American River that is a critical supply in drought conditions. The intake and lower structures were severely damaged by the 2017 flooding/storms. The area and structures needed both hardening against future damage and repair. This was funded by FEMA Claims & internal funding for continued service.

**Water System Interties** – Multiple water system Interties increased redundancy of water supply should any of the hazards cause disruption to the water treatment or delivery system. Between 2017-2019, three Capital Projects were completed in conjunction with the Nevada Irrigation District. The Mt. Vernon, Locksley Lane and the Live Oak Interties are all functional interties between water systems.

**Vegetation Management & Brushing** – Vegetation Management and brushing has taken on a higher priority due to the frequency, intensity and prolonged wildfire season. Multiple projects have been completed with operational funding, capital funding and community partnerships with Cal-fire assistance.

- ✓ Vegetation Management & Brushing of the surrounding area of the Maidu Field Office through the Canyon Fire Resiliency Project 2020 Agency Capital funding and partnership
- ✓ Vegetation Management & Brushing below American River Pump Station power lines was funded by 2020 Agency operational funding
- ✓ 2019 Monta Vista Treatment Plant was thinned and brushed in cooperation with Cal-Fire and adjacent landowners to ensure water storage would be safe from wildfire and treefall. This was accomplished with operational funding and partnership with Cal Fire.
- ✓ In 2015, 33-acres around Lake Arthur were cleared and brushed in partnership with Cal-Fire and local landowners.

- ✓ 2016/17, 78 acres around Lake Theodore were cleared and brushed in partnership with Cal Fire and local landowners
- ✓ A Vegetation Management & Brushing project was completed on a large plot of un-developed Agency Land on Bill Francis Drive. The project was completed with a Cal-Fire partnership.

**Debris, sedimentation de-silting projects** – Debris, sedimentation and de-silting projects are important for dam safety enhancing the water storage capacity and removing debris that can cause problems for the safe operation of the dam. In addition, the de-silting adds water capacity for water storage and drought management. In 2016, 2017 and 2018 Emergency and Capital projects were completed for Ralston Afterbay, and the North & South Fork Diversions.

**Dam management** - The Mammoth reservoir low level outlet was replaced with an automated valve in 2020. The replacement allowed for automated operation to enhance water management for storms and water storage. This was an Agency capital project.

## R.7 Mitigation Strategy

### R.7.1. Mitigation Goals and Objectives

The PCWA adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy.

### R.7.2. Mitigation Actions

The planning team for the PCWA identified and prioritized the following mitigation actions based on the risk assessment. Background information and information on how each action will be implemented and administered, such as ideas for implementation, responsible office, potential funding, estimated cost, and timeline are also included. The following hazards were considered a priority for purposes of mitigation action planning:

- Agriculture Pests and Diseases
- Avalanche
- Climate Change
- Dam Failure
- Drought & Water Shortage
- Floods: 1%/0.2% annual chance
- Floods: Localized Stormwater
- Landslides, Mudslides, and Debris Flows
- Pandemic
- Severe Weather: Heavy Rains and Storms
- Tree Mortality
- Wildfire

It should be noted that many of the projects submitted by each jurisdiction in Table 5-4 in the Base Plan benefit all jurisdictions whether or not they are the lead agency. Further, many of these mitigation efforts are collaborative efforts among multiple local, state, and federal agencies. In addition, the countywide

public outreach action, as well as many of the emergency services actions, apply to all hazards regardless of hazard priority. Collectively, this multi-jurisdictional mitigation strategy includes only those actions and projects which reflect the actual priorities and capacity of each jurisdiction to implement over the next 5-years covered by this plan. It should further be noted, that although a jurisdiction may not have specific projects identified for each priority hazard for the five year coverage of this planning process, each jurisdiction has focused on identifying those projects which are realistic and reasonable for them to implement and would like to preserve their hazard priorities should future projects be identified where the implementing jurisdiction has the future capacity to implement.

### ***Multi-Hazard Actions***

#### ***Action 1. Develop Operable Dam Spillway Gates at Hell Hole Reservoir***

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**Hazards Addressed:** Dam Failure, Severe Weather, Flooding and Drought Water Supply

**Goals Addressed:** 1, 2, 3, 4, 5, 7

**Issue/Background:** This project will improve Hell Hole's currently uncontrolled spillway. The improvements will allow capture of approximately 6,000 acre-feet of additional water that would otherwise escape over the spillway. This project increases the water storage and allows greater control of reservoir water levels during severe weather, flooding and drought conditions as well as adding a level of dam safety through management of the spillway.

**Project Description:** The project will install operable gates on the currently fixed spillway at Hell Hole Reservoir. Being able to keep the gates lowered during winter will preserve the current mode of safe reservoir operation during winter. Raising the gates in spring will allow capture of spring runoff that would otherwise escape over the spillway.

**Other Alternatives:** Do nothing.

**Existing Planning Mechanism(s) through which Action Will Be Implemented:** The project was identified when preparing PCWA's new license application for the Middle Fork American River Hydropower Project. Construction, operation, and maintenance will be performed by Placer County Water Agency (PCWA).

**Responsible Agency/ Department/Partners:** PCWA

**Cost Estimate:** \$5,000,000

**Benefits (Losses Avoided):** Impounded water will be available to users first within the county and secondarily outside the county. During droughts this water will bolster the supply.

**Potential Funding:** Middle Fork Finance Authority Capital

**Timeline:** Completion in 2025

**Project Priority (H, M, L):** High

## **Action 2.      *Alternate Intake for Alta Water Treatment Plant***

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**Hazards Addressed:** Severe Weather: Heavy Rains & Storms, Freeze & Snow, Drought & Water Shortage

**Goals Addressed:** 1, 2, 3, 4, 5, 7

**Issue/Background:** The Alta Water Treatment Plant receives its source water from the PG&E Alta Powerhouse Intake and is susceptible to spills within the intake structure house, oil, solvents and other chemicals that may be in the building. Also, in the event of a fuel spill that impacts the Towle Canal, water needs to flow from the canal, through Alta Forebay, then to the PG&E powerhouse intake, a process that may take several days. Alta forebay is also susceptible to freezing, impairing water flow to the treatment plant.

**Project Description:** This project will install a structure and piping to allow for the raw water inflow to the treatment plant to come from Towle Canal, near the point where the canal enters Alta forebay.

In the event of a fuel, or other contamination in the Towle canal, raw water supply can be restored to the treatment plant after the water in Towle canal has been deemed safe, a much shorter time period than waiting for the contamination to be removed from Alta forebay.

**Other Alternatives:** No action

**Existing Planning Mechanism(s) through which Action Will Be Implemented:** PCWA Capital Improvement

**Responsible Agency/ Department/Partners:** PCWA Technical Services. PG&E

**Cost Estimate:** \$ 450,000

**Benefits (Losses Avoided):** Restoration of water supply to Alta WTP in a shorter period of time; water supply in the event of the forebay freezing over, water supply in the event there is an issue with the PG&E intake structure.

**Potential Funding:** HGMP grant funding, State grant funding, PCWA CIP budget

**Timeline:** Undetermined, unfunded.

**Project Priority (H, M, L):** Medium

## **Action 3.      *Canal Access for Fire Fighting and water source***

---

**Hazards Addressed:** Wildfire, Drought and Water Shortage

**Goals Addressed:** 1, 2, 3, 4, 5, 6, 7

**Issue/Background:** The area east of the City of Auburn is comprised of many rural communities, receiving water from small water systems, PCWA canals, or wells.

In many of these areas, fire equipment cannot cross canal to access or escape fires. This project will work in conjunction with local fire agencies and Cal-Fire to determine locations along the canal where having the ability to access with fire equipment to cross the canals, or access the canals as a source of water for fire suppression.

**Project Description:** This project will cooperate with local fire agencies and Cal-Fire to determine locations where canal crossings are desired, and locations that are suitable as a water source for fire suppression equipment.

**Other Alternatives:** No Action

**Existing Planning Mechanism(s) through which Action Will Be Implemented:** PCWA Capital Improvement

**Responsible Agency/ Department/Partners:** PCWA Technical Services

**Cost Estimate:** \$500,000

**Benefits (Losses Avoided):** Fire equipment will have designated locations to cross canals, reducing the potential of causing damage to the canals, hence reducing the water supply to PCWA and private WTP's. Further, fire personnel will know where and how to access a reliable water supply, minimizing the potential of contaminating the water within the canal.

**Potential Funding:** HGMP grant funding, State grant funding, PCWA CIP budget

**Timeline:** Undetermined, not studied or funded

**Project Priority (H, M, L):** M

**Action 4.** *Back-up and Stand-By Power Generation for critical community drinking and fire suppression water supply.*

---

**Hazards Addressed:** Mukti-hazard (Agriculture Pests and Diseases, Avalanche, Climate Change, Dam Failure, Drought & Water Shortage, Floods: 1%/0.2% annual chance, Floods: Localized Stormwater, Landslides, Mudslides, and Debris Flows, Pandemic, Severe Weather: Heavy Rains and Storms, Tree Mortality, and Wildfire). Natural or intentional interruption of primary power supply to critical facilities providing community drinking and fire suppression water.

**Goals Addressed:** 1, 2, 3, 4, 5, 6, 7

**Issue/Background:** After the 2018 Camp Fire, the most destructive and deadly wildfire in California history, PG&E and other electrical utilities implemented Public Power Safety Shutoffs (PSPS) to help prevent wildfires during high, dry, wind events that typically occur in the fall, from arcing or downed power lines.

For PCWA, these PSPS events typically occur during PG&E fall maintenance activities on their canals and powerhouses, effectively eliminating the PG&E water supply to PCWA.

PCWA utilizes pumping from the American River during these maintenance outages to supplement and/or replace this water supply.

PG&E has told PCWA that they will not be creating micro-grids or provide mobile power generation to keep critical PCWA water supply facilities powered during PSPS events.

**Project Description:** Project will identify the critical PCWA facilities that do not have stand by power generation and determine the best solution to provide power during any power interruptions.

**Other Alternatives:** None. These facilities are critical for the continued, uninterrupted, water supply for the PCWA service area, and when available, water supply for adjacent water suppliers

**Existing Planning Mechanism(s) through which Action Will Be Implemented:** Capital budgets and grant funding.

**Responsible Agency/ Department/Partners:** PCWA Technical Service and Drinking Water Operations, and coordination with PG&E

**Cost Estimate:** \$5,000,000

**Benefits (Losses Avoided):** Uninterrupted water supply to the PCWA service area, including PCW's largest service area supplying water to 161,750 persons and fire hydrants

**Potential Funding:** PCWA and grant funding

**Timeline:** 2 to 10 years

**Project Priority (H, M, L):** High

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**Action 5.      *Lake Arthur Pumping Station***

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**Hazards Addressed:** Flooding, Drought & Water Shortage, Severe Weather, Wildfire. Increases reliability of water supply

**Goals Addressed:** 1, 2, 3, 4, 5, 7

**Issue/Background:** In the event of a PG&E canal failure west of the Lake Arthur, the primary water supply to PCWA from PG&E is eliminated or significantly reduced. Fuel spills from vehicles or trains that enter PCWA and/or PG&E canals can also reduce the water supply to PCWA.

Water supplies to PCWA are also reduced during annual maintenance activities on PG&E canals.

**Project Description:** The Boardman canal traverses the hillside approximately 40 feet above and 100 feet away from Lake Arthur. The installation of one of more pumps will provide access to more than 80 acre feet of water into the Boardman canal, hence the Auburn, Foothill and Sunset water treatment plants.



**Other Alternatives:** Release water from Lake Arthur into Rock Creek Reservoir for potential release into the PG&E canal system, if available.

**Existing Planning Mechanism(s) through which Action Will Be Implemented:** PCWA Capital Improvement

**Responsible Agency/ Department/Partners:** PCWA Technical Services

**Cost Estimate:** \$ 850,000

**Benefits (Losses Avoided):** Access to additional water supply at a location that would benefit the upper PCWA raw water system and Auburn WTP.

**Potential Funding:** HGMP grant funding, State grant funding, PCWA CIP budget

**Timeline:** Unknown, not currently funded

**Project Priority (H, M, L):** Medium

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**Action 6.**      *Monte Vista Spill Improvements and Cedar Creek Canal Encasement in Pipe*

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**Hazards Addressed:** Severe Weather, Flooding, Landslide prevention of canal failure,

**Goals Addressed:** 1, 2, 3, 4, 5, 7

**Issue/Background:** With climate change, precipitation events are expected to increase in intensity and in amounts of precipitation in the form of rain. The Cedar Creek Canal intercepts sheet flows and debris from these precipitation events and conveys them to the Monte Vista spill; automation of this spill will regulate the amount of flow allowed to continue within the Cedar Creek Canal, releasing excess flows to Canyon Creek. Automation will also remove large debris from the water, preventing the debris from entering the Gold Run pipe, potentially causing a blockage in the pipe, causing water to backup and overflow at the pipe inlet.

Cedar Creek Canal in an open canal traversing a sheer cliff above interstate 80 and alongside the Union Pacific Railroad, if debris become lodged in the open canal, or on the trash rack at the head of the Gold Run Pipe, water can back up, overtopping the canal, eroding the cliff onto interstate 80 or impairing the Railroad.

**Project Description:** This project will automate the Monte Vista Spill to regulate the flows into the spill and into the Gold Run Pipe. The project will also encase the Cedar Creek canal between Monte Vista Spill and the head of the Gold Run Pipe, approximately 1,900 feet. A detailed description of the project can be found in the 2019 FEMA pre-disaster mitigation grant application.

**Other Alternatives:** None that will provide the same results as what is proposed above.

**Existing Planning Mechanism(s) through which Action Will Be Implemented:** PCWA Capital Improvement

**Responsible Agency/ Department/Partners:** PCWA Technical Services

**Cost Estimate:** \$3,006,000

**Benefits (Losses Avoided):** Interruption of traffic on West bound interstate 80 for an unknown period of time to clear debris and restore canal connectivity; interruption to commerce and travel on the nearby railroad tracks; elimination of the raw water supply to four PCWA and several private water treatment plants.

**Potential Funding:** HGMP grant funding, State grant funding, PCWA CIP budget

**Timeline:** Unknown, 50% design of pipeline portion, not currently funded.

**Project Priority (H, M, L):** High

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**Action 7.      *Pulp Mill Canal Pipeline Encasement***

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**Hazards Addressed:** Drought, Severe Weather, Wildfire, Landslide.

**Goals Addressed:** 1, 2, 3, 4, 5, 6, 7

**Issue/Background:** The northern section of the Pulp Mill Canal traverses the side of a hill below the Southern Pacific Railroad tracks. After two prolonged, heavy precipitation events in 20xx and 20xx, the hillside became saturated, causing the soils under the canal and flumes to slip out, resulting in canal failure. The canal could not be repaired until the water content of the soils allowed for construction equipment to access the area and gunite placed.

**Project Description:** This project would eliminate the north section of the Pulp Mill canal by connecting a new pipeline to the existing pipeline on the south side of interstate 80, continue west along Casa Loma Road, turn north at the Interstate 80 underpass for Alta Bonneybrook Road, and continue to Lake Alta.

**Other Alternatives:** Pipe the existing Pulp Mill Canal from exit of the existing Interstate 80 undercrossing to Lake Alta. This alternative does not mitigate the potential of the hillside failing from over saturation during large precipitation events that are expected to occur with increasing frequency due to climate change.

**Existing Planning Mechanism(s) through which Action Will Be Implemented:** PCWA Capital Improvement

**Responsible Agency/ Department/Partners:** PCWA Technical Services

**Cost Estimate:** \$2,500,000

**Benefits (Losses Avoided):** Eliminates the potential of canal failure, reduces potential of damage from train derailment and associated fluid spill from train.

**Potential Funding:** HGMP grant funding, State grant funding, PCWA CIP budget

**Timeline:** Unknown, unfunded.

**Project Priority (H, M, L):** H

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**Action 8.      *Permanent Pumps in Rock Creek Reservoir (PG&E Reservoir)***

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**Hazards Addressed:** Drought, Severe Weather, Dam Safety, Drought, Water reliability

**Goals Addressed:** 1, 2, 3, 4, 5, 6, 7

**Issue/Background:** Currently, water can only be pumped from Rock Creek Reservoir by installing temporary pumps into the Wise Canal below the reservoir outlet. Reservoir outlet flow must be adjusted to match the temporary pump capacity to prevent flows from continuing in the Wise canal, affecting downstream activities.

These pumps take time to rent, install, and adjust, installation of permanent pumps will provide a ready water supply at any time needed.

**Project Description:** Project would install three to four pumps of varying capacity or variable speed, into a deep section of Rock Creek Reservoir, pumping water into the PCWA Middle Fiddler Green Canal, providing a water supply to NID and PCWA canals and potentially to the PCWA Foothill and Sunset water treatment plants. A fish exclusion screen would also be installed at the suction of each pump.

**Other Alternatives:** Purchase temporary pumps and crane system to allow for the pumps to be lowered into Wise Canal in a shorter time period than the current method.

**Existing Planning Mechanism(s) through which Action Will Be Implemented:** PCWA Technical Services Capital Improvement Plan

**Responsible Agency/ Department/Partners:** PCWA Technical Services, Field Services, Drinking Water Operations. Partners with NID, PG&E, FERC, and CDFW

**Cost Estimate:** \$5,000,000

**Benefits (Losses Avoided):** Additional water source in the event of a PG&E or PCWA canal failure, Drought, PG&E water reductions, severe weather

**Potential Funding:** HGMP or State grant funding, PCWA CIP

**Timeline:** Unknown, concept and temporary practice currently.

**Project Priority (H, M, L):** H

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**Action 9.      *Vegetation Management at PCWA Wooden Flumes***

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**Hazards Addressed:** Wildfire, Tree Mortality, Severe Weather, water reliability.

**Goals Addressed:** 1, 2, 3, 4, 5, 6, 7

**Issue/Background:** The PCWA raw water conveyance system east of the City of Auburn, generally along the Interstate 80 corridor. Water is conveyed across ravines and small valleys using flumes with timber frame understructures. Many of these flumes are in heavily wooded, brushy, remote areas.

In the event of a wildfire, there is the potential that the understructure of the flumes could be damaged, causing the canal to spill its contents, potentially creating additional damage to the surrounding area. Further, the water supply to PCWA and private treatment plants is reduced or eliminated, reducing treated water storage, hence water supply to fire hydrants.

**Project Description:** This project would significantly reduce the amount vegetation within 200 feet of the flume, then remove less vegetation an additional 300 feet to either side of the flume and 1,000 feet up and downstream of the flume, along the alignment of the canal. There are 17 timber frame flumes for this project. A project description available upon request.

**Other Alternatives:** Remove only vegetation within 10 feet of the canal. No Action

**Existing Planning Mechanism(s) through which Action Will Be Implemented:** PCWA Capital Improvement

**Responsible Agency/ Department/Partners:** PCWA Technical Services

**Cost Estimate:** \$500,000

**Benefits (Losses Avoided):** At the conclusion of the project, each flume will have a defensible space that firefighting efforts can be implemented with minimum hazard to the flume and personnel. Water supplies to PCWA and private treatment plants remains uninterrupted.

**Potential Funding:** HGMP grant funding, State grant funding, PCWA CIP budget

**Timeline:** Ongoing

**Project Priority (H, M, L):** High

**Action 10. *Enhance Canals by Converting Earthen Canals to Gunite-Lined Canals in Critical Areas.***

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**Hazards Addressed:** Drought/Landslide-Debris/Hazardous Materials/Wildfire

**Goals Addressed:** 1, 2, 3, 4, 5, 6, 7

**Issue/Background:** In 2011 a PG&E's Canal failed sliding off a hillside and causing water rationing and irrigation water shortages. Unlined dirt canals also lose water through seepage intensifying drought situations. Rodents can cause earthen canal failures through burrowing. Canals can be damaged by wildfire with more of a tendency to slide. Firefighting is also dependent on a consistent water supply.

**Project Description:** PCWA has an on-going capital improvement fund for lining canals, but there are more than 177 miles of canal with most originating in the 1800s. The Agency funds \$1-million a year to guniting a little less than two miles a year.

**Other Alternatives:** Some sections are put into pipe.

**Existing Planning Mechanism(s) through which Action Will Be Implemented:** Ongoing operational maintenance, improvements, and capital spending.

**Responsible Agency/ Department/Partners:** PCWA

**Cost Estimate:** Approximately \$96 a foot on average

**Benefits (Losses Avoided):** Water shortages impacting water supply, operations and revenue. Canals intersect highways and rail-lines where a disruption failure could cost millions per hour in delayed commerce.

**Potential Funding:** Agency capital and operational budgets, grants to supplement?

**Timeline:** Annually complete approximately two miles or 10,560 feet a year

**Project Priority (H, M, L):** High

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**Action 11.      *Wildfire prevention or Wildfire firefighting enhancements.***

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**Hazards Addressed:** Wildfire and first responder enhancements

**Goals Addressed:** 1, 2, 3, 4, 5, 6, 7

**Issue/Background:** PCWA has operations spanning across multiple state, local and federal forests with a history of wildfire. There has always been a strong interest in being a cooperative agency in conjunction with fire and emergency services.

**Project Description:** There are multiple concepts that can potentially be developed for fire prevention or fire suppression support including: transformer-yard fire barriers or extinguishment, additional locations for fire cameras, water access enhancements, wildfire or emergency evacuation-areas, equipment staging areas, public emergency communications enhancements and aviation and rescue enhancements. (landing areas.)

**Other Alternatives:** Unknown

**Existing Planning Mechanism(s) through which Action Will Be Implemented:** Some ideas are internal to the Agency others may be cooperative partnerships.

**Responsible Agency/ Department/Partners:** Dependent of specific projects and stakeholders

**Cost Estimate:** Unknown, unstudied



**Benefits (Losses Avoided):** Life safety and wildfire prevention or

**Potential Funding:** Unknown at this point

**Timeline:** Unknown at this point

**Project Priority (H, M, L):** M

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**Action 12.**      *Replace Wooden Flume Structures*

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**Hazards Addressed:** Wildfire and Drought

**Goals Addressed:** 1, 2, 3, 4, 5, 6, 7

**Issue/Background:** Wooden flumes are subject to destruction from natural elements and wildfire. The flumes are critical connections in a gravity fed canal system running through valleys and from hill to hill. Flumes are critical for the stability of the water supply for both domestic water and irrigation water.

**Project Description:** Canals run into pipe rather than flumes have less of a probability of failing and have a greater chance of surviving wildfire.

**Other Alternatives:** Undergrounding pipe and pumpstations

**Existing Planning Mechanism(s) through which Action Will Be Implemented:** Capital budgets as priorities allow. Three flumes have been piped or encased, 30 more exist as wooden structures.

**Responsible Agency/ Department/Partners:** PCWA

**Cost Estimate:** \$12-million plus

**Benefits (Losses Avoided):** \$2.7-million in replacement value at risk without considering subsequent losses including water supply and firefighting.

**Potential Funding:** Agency Capital funding & grants

**Timeline:** One every five years? 150 Years?

**Project Priority (H, M, L):** High

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**Action 13.**      *Reservoir - dam capacity and water management improvement projects.*

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**Hazards Addressed:** Dam Failure, Flooding, Drought, Severe Weather and Climate Change

**Goals Addressed:** 1, 2, 3, 4, 5, 6, 7

**Issue/Background:** The Agency has 16-reservoirs of varying size and hazard, all with water regulating appliances such as a dam, spillway, checkboard system or low-level outlet for the control of water. Over

time reservoirs collect sedimentation displacing storage capacity and creating challenges rising water levels or water management devices. Almost any reservoir improvement quickly becomes a large capital project. Particularly hazardous is debris from wildfires that threaten the dams or spillways.

**Project Description:** Sedimentation removal, dam or spillway projects or maintenance, improving capacity or increasing safety, water management, and water storage.

**Other Alternatives:** Accept the risk of severe outlying hazards beyond current experience.

**Existing Planning Mechanism(s) through which Action Will Be Implemented:** Capital improvement projects.

**Responsible Agency/ Department/Partners:** PCWA in partnership and cooperation of DSOD and FERC

**Cost Estimate:** Many of the projects are undetermined and require study.

**Benefits (Losses Avoided):** Improved dam safety and water management

**Potential Funding:** Capital Improvement Funds

**Timeline:** Undetermined, may arise from inspections, and requires study and project specifications

**Project Priority (H, M, L):** M

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**Action 14.**     *Rockfall anchoring, stabilization, rockfall netting and slide debris mitigation.*

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**Hazards Addressed:** Landslides, mudflows & debris flow. Severe Weather and Wildfire

**Goals Addressed:** 1, 2, 3, 4, 5, 6, 7

**Issue/Background:** The Agency has had multiple slides blocking access routes to operational and wilderness recreational areas or areas where existing roads have fallen off the mountainside. While we have done extensive geological studies and stabilized hillsides above many of our assets, wildfires and extreme storms create dynamic slide conditions. There are areas where existing slides that have destroyed or blocked roadways and need to be cleaned up for emergency and fire access.

**Project Description:** Continue to study and identify locations where roads and facilities may be at risk for earth movement and address with anchoring, stabilization and rockfall netting. Where roadways are blocked, clear debris from roadways and stabilize the remaining hillside. In some cases the hillsides below roadways need to be stabilized.

**Other Alternatives:** Do nothing and spend money clearing roadways after a slide.

**Existing Planning Mechanism(s) through which Action Will Be Implemented:** Existing Blacksmith Flat Road, Mosquito Ridge Road slide could be done in cooperation between the Forest Service and perhaps facilitated with grant funding.

**Responsible Agency/ Department/Partners:** Arrangements with the roadway owners, Forest Service and others along with grants and Capital funding for PCWA owned roadways.

**Cost Estimate:** Typically, one to fifteen million per location

**Benefits (Losses Avoided):** Increases access for fire services, recreation, and Agency operations

**Potential Funding:** Depends on the roadway ownership.

**Timeline:** As studied, identified, and needed.

**Project Priority (H, M, L):** Priority assigned dependent on the criticality of the area. Existing slides are H.

#### ***Action 15. Zone 3 Automation***

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**Hazards Addressed:** Severe Weather, Flooding Canal failure, and reliability of water supply,

**Goals Addressed:** 1, 2, 3, 4, 5, 6, 7

**Issue/Background:** With climate change, precipitation events are expected to be more intense for shorter periods of time, with the canals intercepting increased run off and debris, that may lodge in the canal perimeter, inlets to flumes, or piped inlets, causing the canal to overtop, potentially causing canal failure, or failure of a hillside below the canal, interruption the PCWA water supply to PCWA and Private water treatment plants.

**Project Description:** This project will install automated headgates at each of the spills (controlled release points) to regulate the flows downstream of each automated headgate into the canal and releasing excess flows, up to the historical maximum(s), into the spill channel, measuring each of these flows for record keeping and planning.

**Other Alternatives:** No Action

**Existing Planning Mechanism(s) through which Action Will Be Implemented:** PCWA Capital Improvement

**Responsible Agency/ Department/Partners:** PCWA Technical Services

**Cost Estimate:** \$ 2,000,000

**Benefits (Losses Avoided):** During large precipitation events, only the amount of water needed to meet demands is allowed to remain in the canal, all other water is released in a controlled manner, reducing the potential for damage to the canal and the spill way. Further, the automated headgates adjust to changing conditions in real time.

Adding the automated headgates to the SCADA systems also allows for remote control and monitoring of the canal system, allowing the operators to narrow areas that may need to have operator intervention to restore flows in the canal, or narrow where there may be an issue with the canal.

**Potential Funding:** HGMP grant funding, State grant funding, PCWA CIP budget

**Timeline:** Unknown, Concept stage of planning.

**Project Priority (H, M, L):** Medium

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**Action 16.      *Pumps at Halsey Forebay***

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**Hazards Addressed:** Drought, Severe Weather, Water supply reliability.

**Goals Addressed:** 1, 2, 3, 4, 5, 6, 7

**Issue/Background:** In the event of the Bear River Canal is out of service, or water is unavailable to the PCWA Upper Bowman Canal to provide water to the Bowman Canal, hence the PCWA Bowman and Christian Valley water treatment plants, storage in PG&E Halsey Forebay may be available as an alternate water supply.

**Project Description:** This project will install permanent pumping facilities, either electric, diesel powered, or both, at PG&E Halsey Forebay, connecting to existing piping under Christian Valley Road, to supply water to the Bowman Canal for use at the PCWA Bowman and Christian Valley WTP's.

**Other Alternatives:** No Action

**Existing Planning Mechanism(s) through which Action Will Be Implemented:** PCWA Capital Improvement

**Responsible Agency/ Department/Partners:** PCWA Technical Services, PG&E

**Cost Estimate:** \$500,000

**Benefits (Losses Avoided):** Additional/supplemental water supply to the PCWA Bowman and Christian Valley water treatment plants.

**Potential Funding:** HGMP grant funding, State grant funding, PCWA CIP budget

**Timeline:** Unknown, concept.

**Project Priority (H, M, L):** M

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**Action 17.      *Backup Electrical Generation at American River and Ophir Road Pump Stations***

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**Hazards Addressed:** Drought, Severe Weather, Water supply reliability, power interruptions.



**Goals Addressed:** 1, 2, 3, 4, 5, 6, 7

**Issue/Background:** Since 2018, PG&E and other California power suppliers have used Public Power Safety Shutoffs (PSPS) to reduce the potential of wildfires that may occur due to high winds and dry weather that may damage power lines. These PSPS event generally occur during the same time period when PG&E performs maintenance activities on their hydroelectric canal system, Reducing the primary water supply for PCWA by 90%.

During these PG&E maintenance activities, PCWA utilizes a backup water supply from the American River, a PSPS event during this time effectively eliminates the entire PCWA water supply, hence treated water to over 200,000 persons and businesses.

To deliver water to the PCWA treatment plants, water must first be pumped from the American River into a tunnel under the City of Auburn, then pumped from the tunnel to an adjacent canal, or pumped again directly to at PCWA treatment plant.

**Project Description:** This project will install sufficient diesel-powered electrical generation, providing and un-interrupted water supply from the American River during PSPS or other electrical interruptions that occur during the same time as a reduction in water supply.

**Other Alternatives:** No Action

**Existing Planning Mechanism(s) through which Action Will Be Implemented:** PCWA Capital Improvement

**Responsible Agency/ Department/Partners:** PCWA Technical Services, PG&E

**Cost Estimate:** \$8,000,000

**Benefits (Losses Avoided):** Uninterrupted water supply to PCWA treatment plants, hence treated water supply to over 200,000 persons and businesses

**Potential Funding:** HGMP grant funding, State grant funding, PCWA CIP budget

**Timeline:** 3 years

**Project Priority (H, M, L):** H

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**Action 18.**     *Sierra Forest Restoration Partnerships*

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**Hazards Addressed:** Forest fire & Tree Mortality

**Goals Addressed:** 1, 2, 3, 4, 5, 6, 7

**Issue/Background:** Wildfires are growing in frequency, size and severity. This project aims to reduce high severity wildfires and restore forest health by studying and treating forest ecosystems in the American River Watershed.

**Project Description:** Multiple partners have found shared interests in the American River Watershed and have sponsored, and are working the project to thin overgrowth and restore natural meadows as firebreaks. The work is creating healthy, forests resistant to wildfire. The wildfire fuels are being harvested for energy and raw material use. Scientific study is ongoing.

**Other Alternatives:** Single interest entities have not been able to implement viable alternatives.

**Existing Planning Mechanism(s) through which Action Will Be Implemented:** The Sierra French Meadows Partnership is an ongoing and collaborative partnership forwarding the goals of the Project.

**Responsible Agency/ Department/Partners:** PCWA, Placer County, The U.S. Forest Service, the Nature Conservancy, The Sierra Nevada Conservancy, The American River Conservancy and UC Merced SNRI.

**Cost Estimate:** \$5-20-Million

**Benefits (Losses Avoided):** Indirect costs are not calculated, but potential cost for emergency debris and sedimentation removal may exceed \$13-million. Timber, recreation loss and grazing land values are not calculated here.

**Potential Funding:** Grants and continued funding from the partners.

**Timeline:** Ongoing

**Project Priority (H, M, L):** H